

# THE AMERICAN STATISTICIAN

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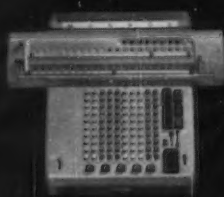
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## The President's Column

### FEDERAL STATISTICAL PROGRAMS



Martin R. Gainsbrugh

From its early history to date, the American Statistical Association has shown an intense professional concern in Government statistics. Today, an important part of our Association activities is aimed at improving the kinds and quality of general purpose Government data available for our many uses. The standing committees of the Association include the Advisory Committee to the Bureau of the Budget on Statistical Policy, the Census Advisory Committee, and the Committee on Data Sources, all directly concerned with data produced and distributed by Federal agencies. Other committees and a number of the Association sections have more than a passing interest in the Government's output of statistical data and its use in the solution of practical problems.

This close historic link between the Federal statistical system and the Association was brought forcefully to mind recently when I addressed the dinner meeting of the Washington Statistical Society. Most of the data I used in my talk on the state of the economy, e.g. the industrial production index, the national income and product estimates, the data on the labor force and on prices, are produced by agencies in Washington. The audience included members of the Association who were in a position to consider and act on the recommendations I discussed. Many of them are also active in the affairs of the Association, including Raymond Bowman, Assistant Director for Statistical Standards of the Bureau of the Budget and a Director of the Association. Among those introduced to the audience were David Bell, new Director of the Bureau of the Budget, James Tobin, of the Council of Economic Advisers, Mortimer Caplin, the new Director of the Internal Revenue Service, and Richard Scammon, then Director-designate of the Bureau of the Census. Included in the audience were past presidents Aryness Wickens, Stuart Rice, Morris Hansen, and other old friends from the Bureau of the Budget, the Bureau of the Census, the Bureau of Labor Statistics, the Office of Business Economics, the Federal Reserve Board, the Agricultural Marketing Service, the Public Health Service, and other data producing and analytical agencies. These members and their colleagues help produce the economic statistics we as a people live by. With the Association's cooperation this group's interest grows ever keener in exploring the problems of collecting data, in discussing needs, uses, and limitations of data, and in their continued improvement.

The founders of the ASA in 1839 had a primary interest in the improvement of government statistics. Initially, they worked with vital statistics, statistics of commerce and with the content and conduct of the decennial census. Government statisticians have enriched the heritage and traditions and high standards of their colleagues of a century ago.

The Federal statistical establishment has grown substantially since the first data were produced in 1789. When the first population census was taken in 1790, the total cost of that undertaking was \$45,000. Now, when the subcommittee on Census and Government Statistics of the House Post Office and Civil Service Committee surveyed the situation, it reported "... as of June 30, 1959 . . . , 11,171 employees, with annual salaries of \$60,378,359, engaged in statistical operations dealing with information obtained from the American public." These numbers are small in relation to the entire Federal structure but they represent a key organism. Many statistical activities in the Federal Government other than data collection are not included in these figures. The engi-

(Continued on Page 20)

## ASA Officers Nominated

The Association's Committee on Nominations, composed of Philip M. Hauser, Chairman, Walter E. Hoadley, Jr., and W. J. Youden, has nominated officers for 1962. These nominees will be voted on by ASA members in the fall. In making its selections the Committee has attempted to insure balance among the sections and fields of interest in the Association, taking into account both the incumbent officers and those nominated. The President-elect nomination is in accord with the practice followed for some years of rotating the presidency among academic institutions, government and business. The nominees are:

### *President-Elect*

RAYMOND T. BOWMAN, Office of Statistical Standards, U. S. Bureau of the Budget

### *Vice-President (1962-64)*

(one to be elected)

A. H. BOWKER, Department of Statistics, Stanford University

BOYD HARSHBARGER, Department of Statistics and Statistical Laboratory, Virginia Polytechnic Institute

### *Directors (1962-64)*

(two to be elected)

MAURICE I. GERSHENSON, Division of Labor Statistics and Research, California Department of Industrial Relations

ALMARIN PHILLIPS, Graduate School of Business Administration, University of Virginia

CHARLES D. STEWART, U. S. Department of Labor

KENNETH B. WILLIAMS, Division of Research and Statistics, Federal Reserve Board

### *Representative-at-Large (1962-63)*

(one to be elected)

PAUL MEIER, Department of Statistics, University of Chicago

MRS. IDA C. MERRIAM, Social Security Administration, Department of Health, Education, and Welfare

Nominations for District representatives, which are made by the Chapters or on petition of ASA members, will be reported in the October issue. The current officers of the Association are listed on the first page of this issue.

## May Board Meeting

The Board of Directors of the American Statistical Association met on May 5th at the Cosmos Club, Washington, D. C. Those present included President Martin R. Gainsbrugh, President-Elect Philip M. Hauser, Past President Morris H. Hansen, Vice-President Geoffrey H. Moore, Secretary-Treasurer Donald C. Riley, Directors Albert H. Bowker, Raymond T. Bowman, Harold F. Dorn, Dorothy M. Gilford, Frederick Mosteller, and several guests.

The first business was the nomination of a representative on the Social Science Research Council. Nathan Keyfitz, University of Toronto, who had served one term as an ASA representative on the Council, was re-nominated for the 1962-64 term. Other ASA representatives on the Council are Harold F. Dorn and Philip J. McCarthy.

Mr. Riley reviewed again the background of the proposal to publish a Statistician's Handbook. An agreement was reached with the McGraw-Hill Book Company several years ago whereby they would publish a Statistician's Handbook if the American Statistical Association would undertake its preparation. There was difficulty in finding an outstanding statistician to undertake the project. Moreover, there are problems in selecting from an enormous amount of material what should be compressed into one book. The proposal has been made less urgent by the appearance, since it was first discussed, of a number of specialized handbooks.

Recently Ralph E. Burgess has had further discussions with the McGraw-Hill Book Company.

The consensus of the Board was that the Association is not at this time in a position to provide the supervision and interest that the use of its name as sponsor would necessitate. It was moved and carried that because of the changed situation the ASA would not attempt to sponsor the publication at this time, but would send best wishes to Mr. Burgess and the McGraw-Hill Book Company for a successful contribution to the field.

Mr. Riley discussed briefly the audit statement, which had been previously mailed to the Board of Directors. This report, together with a supplemental letter containing recommendations on the operations of the Association, will be printed in an early issue of the ASA JOURNAL. A projection of receipts and expenditures for 1961 indicates a loss of about \$7,000 on normal operations as was forecast in the January 23 meeting of the Council.

The proposal to increase dues was then taken up. (The financial situation of the Association and the need for an increase in dues was discussed in the President's Column of THE AMERICAN STATISTICIAN for April.) Mr. Hauser, who is Chairman of the Committee on Dues, presented the recommendations of the Committee whose members also include Dorothy M. Gilford, Boyd Harshbarger, Charles D. Stewart and Kenneth B. Williams. Mr. Hauser pointed out that ASA has not increased its dues or its staff since 1948 despite its very considerable growth, and that an increase would be in line with similar steps in other associations. The first recommendation was that dues for regular members in the United States and Canada be raised from the present \$8.00 to \$10.50 per year, which would include the JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION. The member would have the option of receiving THE AMERICAN STATISTICIAN for an additional \$1.50, or a total of \$12.00. This recommendation was adopted by the Board after some discussion. The second recommendation, to raise subscription rates for non-member sub-

scribers to the JOURNAL to \$10.50 a year, and separate non-member subscription rates for THE AMERICAN STATISTICIAN to \$3.00 a year was also adopted. The third recommendation, to increase dues for foreign members from \$5.00 to \$6.00 per year was amended to raise the dues to \$7.00 a year. The fourth recommendation, to increase the rate for student members from \$5.00 to \$6.00 was adopted. A recommendation to increase dues for family membership (i. e., where the spouse of a regular member is also a member but does not receive the publications) from \$2.00 to \$3.00 a year was not adopted, so that the cost of a family membership remains at \$2.00. Life membership rates have been recomputed by Mortimer Spiegelman of the Metropolitan Life Insurance Company. These rates were accepted by the Board. Finally, the recommendation of the Committee on Dues for a continuing committee on membership to assist the national office in promotional activity, stimulation of student memberships, etc., was adopted. The Board expressed its appreciation for the work of Mr Spiegelman and the Committee on Dues.

(The action of the Board increasing dues requires the approval of the Council of the ASA. As we go to press, it appeared that a majority of the members of the Council had approved.)

Mr. Riley reviewed recent conferences and special events, including the dinner at the Cosmos Club and the spring meetings at Ithaca held in honor of Professor Willcox, and the presentation of charters to the new Atlanta and Madison chapters. Professor Mosteller was asked to discuss the progress of the Continental Classroom television course in probability and statistics that he and Professor Paul Clifford have been presenting. He reported that the reception has been very favorable.

Mr. Johnson, Chairman of the 1961 Local Arrangements Committee, described briefly the plans for the 1961 Annual Meeting in New York City, December 27-30. The exhibits program is in the hands of a professional Exhibits Manager, Mrs. Dorothy Ryan, and it is hoped to build up this program so that it will be a source of increased revenue to the Association. An outline of the program session being organized for the Annual Meeting was read to the

Board (this appears elsewhere in the News Section of this issue of THE AMERICAN STATISTICIAN).

Mr. Riley reported on plans for the new Membership Directory to be published this year. Arrangements for a combined directory have been worked out with officers of the Institute of Mathematical Statistics and the Biometric Society—ENAR and WNAR. It was suggested that possibly a different arrangement for the publication of membership directories be considered, whereby a directory giving biographical data about members would be issued every five years, with an annual supplement including only names and addresses being issued in the intervening years.

Mr. Hansen noted the printing by the Government Printing Office of the final report of the ASA's Technical Committee on Broadcast Ratings entitled, "Evaluation of Statistical Methods Used in Obtaining Ratings." It was agreed that since the final report had been presented to and accepted by the Committee on Interstate and Foreign Commerce of the House of Representatives the work of the ASA Committee had been completed. It was voted to extend the Association's thanks to William G. Madow, Chairman, Herbert Hyman and Raymond Jessen for an excellent report.

Mr. Mosteller, Chairman of the ASA Committee on the Relationship among Statistical Societies, reviewed developments since the first meeting of representatives of the societies at Onchiota, New York, last September. It was agreed that since much depends on the American Statistical Association, the Institute of Mathematical Statistics and the Biometrics Society—ENAR and WNAR, there should be direct discussion between these societies as to the form closer collaboration should take. A motion was adopted that the President be authorized to appoint a committee, which would include the President-elect, to meet with similar committees from IMS and the Biometrics groups.

The meeting was adjourned at 4:15 p.m.

## 1961 Annual Meeting

Nearly 50 sessions have been scheduled thus far for the Annual Meeting of the American Statistical Association to be held at the Roose-

velt Hotel in New York City, December 27-30, 1961. However, suggestions, particularly for speakers or discussants, would still be welcomed, and should be addressed to the sectional program chairman, or to the chairman of the ASA Program Committee, George P. Hitchings, American Airlines, 100 Park Avenue, New York City. Arthur M. Dutton, University of Rochester, is program chairman for the Biometrics Society—ENAR, as well as for the Biometrics Section of ASA, and Walter Smith, University of North Carolina, is program chairman for the Institute of Mathematical Statistics. Both of these organizations are meeting jointly with the ASA, as are also the American Economic Association, the American Marketing Association and other societies.

The list of sessions planned so far is as follows:

Biometrics Section—Sectional Program Chairman: Arthur M. Dutton, University of Rochester, School of Medicine and Dentistry, P. O. Box 287, Station 3, Rochester 20, N. Y.—GR 3-4400.

1. Biometrical Genetics—Population Genetics; 2. Mathematical Biology; 3. Experimental Design—I; 4. Measuring Risks—Competing Risks; 5. Non-Linear Regression (Joint with SPES); 6. Experimental Design—II; 7. Multiple Comparisons and Ranking Means; 8. Life Tables and Related Problems; 9. Mathematical Biology; 10. Contributed Papers (Two Sessions).

Business and Economic Statistics Section—Sectional Program Chairman: Albert T. Sommers, National Industrial Conference Board, Inc., 460 Park Avenue, New York 22, New York—PL 9-0900

1. The Business Outlook; 2. Unemployment Statistics: Current Interpretations; 3. Inventory Measurements: New Developments and Needs for the Future; 4. Econometric Models: Reappraisal; 5. The Stock Market: Recent Behavior and Outlook; 6. Corporate Profits as a Business Indicator; 7. Economic Growth: Statistical Problems in the Great Debate; 8. Uses and Abuses of Full Employment Models; 9. Government Price Statistics: Issues in the National Bureau's Report; 10. The Commission on Money and Credit: A Review of the Findings; 11. Diffusion

and the Timing of Business Cycle Turning Points; 12. Statistical Problems in Measuring Industrial Capacity; 13. Marketing Implications of the 1960 Census (Joint with Social Statistics Section); 14. Measuring the Balance of International Payments; 15. Statistical Coverage of the Construction Industry: A Critique; 16. Trends in Income Distribution: Interpretation of the Postwar Statistics.

Physical and Engineering Sciences Section—Sectional Program Chairman: Ray B. Murphy, Bell Telephone Laboratories, Inc., 463 West Street, New York 14, New York—CH 3-1000

1. Spectral Analysis in Geophysical Problems; 2. Statistical Problems in Satellite Tracking; 3. Computer Applications; 4. Experimental Statistics; 5. Non-Linear Regression.

Social Statistics Section—Sectional Program Chairman: Eli S. Marks, Case Institute of Technology, Cleveland, Ohio.

1. General Session in Memory of Samuel A. Stouffer — The Present Status and Future Prospects of Social Statistics; 2. Population Changes as Shown in the 1960 Census of the U. S.; 3. The Methods of the 1961 Canadian Census of Population and Housing; 4. Evaluation of Statistical Methods Used in Obtaining TV Broadcast Ratings; 5. International Statistics; 6. Education Statistics; 7. Computer Uses in Social Statistics; 8. Recent Findings in Health Statistics; 9. Developments in Scientific & Technical Personnel Statistics; 10. Statistics & Surveys as Legal Evidence; 11. Contributed Papers—Social Statistics.

Training of Statisticians Section—Sectional Program Chairman: Samuel B. Richmond, Graduate School of Business, Columbia University, New York 27, New York—UN 5-4000.

1. Statistics Training at the Secondary School Level; 2. Audio-Visual Aspects in the Teaching of Statistics; 3. Decision Theory in Basic Statistics Training for Engineering and the Physical Sciences (Joint with Physical and Engineering Sciences Section); 4. Decision Theory in Basic Statistics Training for Business, Economics and the Social Sciences; 5. Statistics in Advertising and Marketing; 6. The Impact of the Computer on the Training of Statisticians.

## Directory of Statisticians

The questionnaire for use in compiling the 1961 Directory of Statisticians will be in the hands of members early this summer. In addition to members of the American Statistical Association, the new Directory will include members of the Institute of Mathematical Statistics, the Biometric Society (Eastern and Western North American Regions). The information called for is very similar to that in the 1958 ASA Directory—name, title, work affiliation, degrees (including year and institution) other postgraduate work, fields of specialization, type of statistical activity, and membership in other associations. The Directory will consist of an alphabetical listing of all members of the above societies, with a notation showing the society to which the member belongs. In addition to the alphabetical listing there will be separate listings by name of the members of IMS, ENAR and WNAR, and of the members of the five sections of ASA.

It is expected that the Directory will be issued sometime in the Fall. One copy will be sent free to ASA members, and will be available to members of the IMS and Biometric Society—ENAR and WNAR at a reduced rate, since these societies are not participating in financial support of the Directory because of the tight time schedule.

## Dinner and Meetings in Honor of Willcox

The Willcox Centennial dinner, held April 15, 1961 at the Cosmos Club in Washington, D.C., was indeed, as the program stated, "A gathering of friends from near and far to honor a great statistician, teacher and world citizen." About 65 statisticians from the United States and several foreign countries were present. Messages were read from President Kennedy, ex-President Einaudi of Italy and other notables. Among the speakers were Juan de Dios Bojorquez of Mexico, Judge Henry W. Edgerton, Justice Felix Frankfurter, and Jacques Rueff, the architect of de Gaulle's financial policy. Stuart A. Rice, chairman of the committee sponsoring the dinner, acted as toastmaster. The printed

program included a picture of Professor Willcox in his study and a reproduction of the first page of the New York Times of March 22, 1861, the date of his birth.

In his remarks at the close of the dinner Professor Willcox said: "I am often asked what is the secret of living so long. I can only say that as long as I feel I can be of use, I will have the will to live."

The following week there were joint spring meetings of the Biometric Society-ENAR, the Institute of Mathematical Statistics (eastern region), and the Biometrics Section, the Section on Physical and Engineering Sciences and the Social Statistics Section of the American Statistical Association at Ithaca in Professor Willcox's honor. The attendance at these meetings was over 260. The sessions included a reception for Professor Willcox and a special session at which he spoke.

## New Encyclopedia of the Social Sciences

Work on a new Encyclopedia of the Social Sciences has started at the University of Chicago under the direction of Bert F. Hoselitz, Editor. Plans call for 12 to 15 volumes with a total of 6 to 7 million words. They provide for a completely new encyclopedia rather than a supplement to or a revision of the old encyclopedia. Publication of all volumes has been tentatively scheduled for a single date in 1965.

Like the original, the new Encyclopedia will encompass the five social sciences: anthropology, economics, political science, psychology, and sociology. In addition, it will include material from the applied fields of medicine, psychiatry, law and education as well as from the humanities, social and economic history, human geography and economic history. Among other things, it will bring together authoritative and succinct accounts of the main theoretical, empirical and methodological findings of the various social sciences.

Special care will be devoted to problems of scientific method in the social sciences, including those of observation and measurement, of formulation of theories, and of the verification or rejection of hypotheses. Since the theory and methods of statistics play a crucial role in

the social sciences, extensive attention will be given to topics in such fields as the collection of data, official statistics, statistical description, sampling, survey methods, design of experiments, data processing, quality control, operations research, theory of estimation and statistical inference.

The new Encyclopedia has been planned as a multi-purpose work for those outside, as well as those within, the social sciences. Major users are expected to be research workers in the social sciences and related fields, teaching faculties at colleges and universities, students at colleges and universities, and executives and administrators in Government, business and elsewhere in need of professionally prepared information. It is expected wide use will be made of the new Encyclopedia in foreign countries, particularly the underdeveloped countries of Asia, Africa, and Latin America, since it will make available to them work prepared in accordance with standards of scholarship current in the more advanced nations.

The purpose of the new Encyclopedia is definitely not to supplant or even to serve as an alternative either to textbooks or to specialized monographs or treatises. Rather, it is designed as a source of information under such circumstances as when a social scientist seeks information on the present state and recent developments in fields other than his own or when a school or other organization does not have extended library collections in the social sciences.

Guidance for the work of the Encyclopedia is provided by an Editorial Advisory Board with W. Allen Wallis, former editor of the *Journal of the American Statistical Association*, as Chairman. The membership of the Board, drawn from the various social sciences and related fields, numbers more than 100 though it is not yet completely constituted. It includes the following members of the American Statistical Association:

David H. Blackwell, Arthur F. Burns, Kingsley Davis, S. N. Eisenstadt, Edwin Goldfield, Harold Hotelling, Q. M. Husain, Mohamed Hussein, Maurice G. Kendall, M. K. Hayat Khan, Simon Kuznets, Paul F. Lazarsfeld, Frederick Mosteller, I. Richard Savage, Joseph J. Spengler,

George J. Stigler, Jan Tinbergen, Shigeto Tsuru, Ralph W. Tyler, and W. Allen Wallis.

The staff includes, at this writing, in addition to Editor Bert F. Hoselitz, Gail Kelly (Anthropology and Sociology), Clare Munro (Psychology and Psychiatry), Martin Taitel, General Member of the Association's 1960 Program Committee, (Economics and Statistics), and Ann Ruth Willner (Political Science).

Offices are at 5836 Greenwood Avenue, Chicago 37, Illinois. As announced last December, the publishers of the new Encyclopedia will be the Crowell-Collier Publishing Company, the Macmillan Company, and the Free Press.

### Consumer Behavior Report

The Foundation for Research on Human Behavior has recently published "Consumer Behavior in 1961," a summary report of a working-group meeting conducted by the Foundation on January 9, 1961, in New York City. The purpose of the meeting was to present new findings about consumer attitudes and inclinations to buy based on a nation-wide sample interview survey conducted in October and November 1960. The report includes presentations by George Katona, Professor of Economics and Psychology, and Program Director, Survey Research Center, University of Michigan; Eva Mueller, Associate Professor of Economics and Program Director, Survey Research Center; Ruth P. Mack, Economist; William F. Butler, Vice-President, Chase Manhattan Bank; and Vernon Lipsett, Economist, General Electric Company.

The report also includes additional data from the more recent January-February 1961 Survey of Consumer Finances, which became available after the New York City meeting, as well as a discussion of the methodological problems involved in making estimates of future consumer expenditures.

The report may be obtained at \$1.00 per copy from The Foundation for Research on Human Behavior, 1141 E. Catherine Street, P.O. Box 1261, Ann Arbor, Michigan.

### New York Area Chapter Collegiate Award Program

A Collegiate Division was created in the New York Area Chapter, American Statistical Association, during the summer of 1960 and John I. Griffin of the Baruch School of Business and Public Administration, of The City University of New York, was designated Chairman. The first major task of the division was the development of a Collegiate Award Program.

A number of considerations led the officers of the Chapter to the decision to establish an award program. It has been felt in the Chapter that the identification of the American Statistical Association, as the professional society in the field of statistics, can effectively be implemented by bringing the Association to the attention of college students. It was recognized that many professional societies, such as those in accounting, marketing, management, and similar areas, are already offering student awards. In a fundamental sense the future of the ASA rests upon the active involvement in its affairs of promising young people. The large number of prominent collegiate institutions located in the New York Area Chapter region made a program of direct college liaison particularly significant.

The initial step in the organizing of the award program was the bringing together of college professors teaching statistics in the New York area colleges. Most of these professors were already members of the ASA, and, in a number of cases, those who were not joined largely because of the new interest created by the chapter program. The Collegiate Division formulated the standards for the awards, specifying that awards were to be given to outstanding undergraduate students of statistics in the selected colleges. All details, such as the selection procedures, specific standards for selection, and the instructional departments involved were left to the college administrations. In other words, at each college the existing faculty procedures for awards were followed in the ASA awards. In the area of statistics a number of difficult problems arose. The term "statistics" had to be broadly construed in order to include the several areas of theory

and application. The widely divergent practices in colleges in respect to the teaching of statistics are well-known; courses may be offered in departments such as mathematics, economics, business administration, education, psychology, and others, in addition to statistics departments as such. The college representatives handling the program of awards in the several colleges deserve great praise for the efforts expended to locate the best candidates from among students working in several departments. In some colleges, particularly those with several constituent schools and several centers of instruction, college committees were formed to handle the selection procedures. Perhaps one of the unintended benefits of this award program has been obtained through the greater sense of common interest in statistics which these college committees have engendered.

The award has been published in the college bulletins of the respective colleges and also announced in the commencement programs, when that is customary. The wording of the award is "The American Statistical Association, New York Area Chapter Award, a \$50.00 cash award, a certificate, and a one-year student membership in the American Statistical Association." A permanent Awards Committee has been established within the Collegiate Division, and this committee will manage the annual award program. Since many more colleges have expressed interest in receiving an award than the present resources of the Chapter permit, a rotation system will be necessary in the case of some of the colleges. The Awards Committee consists of the following professors: Nilan Norris (Hunter College), Chairman; Alice G. Dorworth (Hofstra College); Henry S. Miller (Queens College); J. P. Russell (Polytechnic Institute of Brooklyn); Lowell Schipper (Rutgers University).

The first award winners were presented at the Annual Meeting of the New York Area Chapter on May 17, 1961. The chapter was fortunate in having the National President, Martin R. Gainsbrugh, present to give the awards to the following students: Barnard College—

Susan Irene Langley

Baruch School—

The City College

Thomas R. Allocca

Brooklyn College—

Lawrence Chimerine

Columbia College—

Barry R. Zamoff and

Richard B. Zamoff

Hofstra College—

Walter Bisch

Hunter College—

Herbert Syd Rudnick

Long Island University—

Helen Pape

New York University—

Samuel Hagler

Polytechnic Institute

of Brooklyn—

Cecil W. Farrow

Queens College—

Kenneth Cohen

Rutgers University—

Kenneth ReCorr

St. Johns University—

John Anthony Ventimiglia

### Exhibit in Honor of Howard Whipple Green

The Cleveland Health Museum has dedicated an exhibit in honor of the late Howard Whipple Green who died in 1959. Mr. Green was a noted statistician who conducted extensive research into population problems during his lifetime. Through such efforts, he made substantial contributions to health and welfare agencies in the Greater Cleveland area. He was also one of the original founders of the Health Museum and served for 23 years as secretary of the Board of Trustees until his death.

The exhibit, entitled "Why Our Nation Grows" traces the phenomenal growth of the U.S. population which increases at the rate of 340 each hour. It also reveals that immigration and advancements in public health are chief causes of this continuing growth.

Among those present at the dedication was Mrs. Howard Whipple Green, wife of the long-time Health Museum benefactor. Friends of Mrs. Green were responsible for the gift to the Health Museum.

The exhibit will become a permanent fixture at the Cleveland Health Museum, one of the Nation's most respected health education institutions.

### Agricultural Meteorology Meetings

Four meetings are planned during the summer and fall of 1961 which will bring together agricultural sciences in which meteorology is applied. The first of these will be held June 20-22 at the University of California at Davis, California. The Pacific Division of the American Association for the Advancement of Science and the American Meteorological Society offer a program emphasizing water relations but including air pollution and general meteorology.

The American Farm Economics Association meeting at Colorado State University, Fort Collins, Colorado, August 14-16, includes a session on weather as it affects crop production, economic analysis and farm management decisions. The American Meteorological Society is participating in the sessions.

The American Institute of Biological Sciences, with the American Meteorological Society cooperating, presents a Symposium on Weather and Organisms at Purdue University, Lafayette, Indiana, August 27-31.

The last meeting will be held November 27-28 at St. Louis. This is the Fourth Conference on Agricultural Meteorology of the American Meteorological Society, which takes place this year in conjunction with the National Meeting of the American Society of Agronomy.

These meetings are in part the result of the formation of a Joint Committee on Agricultural Meteorology during the Third Conference on Agricultural Meteorology held at Kansas City in May 1960. Representatives of several societies, including the American Statistical Association, participated in the formation of this Joint Committee to coordinate activities in agricultural meteorology and climatology. ASA representation consisted of the Committee on Statistics in Meteorology, of which the chairman is H. C. S. Thom, U. S. Weather Bureau.

### UCLA Summer Program For Industry

The sixth annual summer program, "Statistical Methods in Industry", will be given on the Los Angeles campus of the University of California, July 31 to August 11, 1961.

This is an intensive program designed to bring engineers, scientists, executives, inspection personnel and others in industrial and governmental organizations up to date in practical uses of statistics. Participants are offered a choice of one of the following six courses which are given concurrently: Quality Control by Statistical Methods, Industrial Statistical Methods, Statistical Design and Analysis of Industrial Experiments, Engineering and Management of Reliability, Basic Electrical Measurements and Standards, and Fundamental Principles of Non-destructive Testing.

The fee of \$350 includes enrollment in one of the courses, all texts and class supplies, use of University facilities and admission to the special features. Housing and meals will be available on the campus at very reasonable rates.

Further information may be obtained from Edward P. Coleman, Professor of Engineering, Engineering Building I, University of California, Los Angeles 24, California.

### Computer Workshop

Syracuse University is offering a four-week "Workshop in Statistical Computer Use," August 7 to September 1, 1961. The workshop is intended as a basic course, especially for faculty members and graduate students, in which emphasis will be placed upon the use of automatic data processing equipment, use of library programs and sub-routines, and elements of programming for statistical problems. Laboratory work in the Syracuse University Computing Center will be included. The course will be conducted by Dr. Linton C. Freeman.

The workshop carries graduate credit of four semester hours, with tuition at \$39 per credit hour. Registrants will be housed in conference sections of University dormitories, at a rate of approximately \$35 per week for room and board.

Further information may be obtained from the Secretary of Admissions and Housing, Division of Summer Sessions, Syracuse University, 805 S. Crouse Avenue, Syracuse 10, New York.

### Negative Binomial Tables

A Fortran program to compute Negative Binomial Probability Distribution Tables is now available.

The program operates in two modes; 1) input of a single mean and variance to output a single table and 2) input of a single mean and initial, incremental, and final variances to output a series of tables. Unlimited input in a chosen mode is restricted to one card (record) per input.

Output tables include a heading, page number, associated mean and variance, the numerical value of the

variables  $Q, K, 1 - \sum_{j=1}^K P_j, P_0$ , and four successive probabilities across each line. Each supplementary page of a table has its own page number and a modified heading. Up to 1,000 probabilities can be computed and printed in floating point mode, from  $P_0$  to  $P_{999}$ , with a numerical threshold chosen by the user.

Copies of the program, with operating instructions, will be provided upon request. All inquiries should be addressed to: Logistics Research Project, The George Washington University, 707 22nd Street, N.W., Washington 7, D.C. Attn: M. Hershkovitz.

### Ohio Statistical Abstract

The Ohio Department of Industrial and Economic Development recently published the "Statistical Abstract of Ohio: 1960," the first such volume on the State. The Abstract contains 239 pages of detailed information about the State as a whole, all 88 counties, and metropolitan areas and various subdivisions. Ohio's standing in various categories is compared with that of other states and the nation.

The volume is divided into the following sections: population and religion; vital statistics; area, temperature and climate; education; parks and recreation; employment, earnings and work stoppages; military and veterans affairs; welfare services and social insurance; agriculture; state government; local government; income and prices; elections; law enforcement; finance, banking and insurance; minerals and mining; manufacturing, construction and trade; motor vehicles and highways; and transportation, communications and public utilities. Each section presents explanatory materials concerning the data and the

sources and manner of collection, together with definitions and discussions of the tables themselves.

The Director of the Department of Industrial and Economic Development, Koder M. Collison, said plans call for annual editions of the Abstract to provide information to state and local government officials, development organizations, Chambers of Commerce, students and research workers, and other persons interested in the availability of basic data on the Ohio economy.

### Motor Vehicle Fleet Accident Experience Standards

Standards for recording and measuring motor vehicle fleet accident experience are now available. The standards, which have been published by the American Standards Association, were developed under the sponsorship of the National Safety Council and American Trucking Associations, Inc. The American Statistical Association representative on the committee preparing the standards was Jules V. Quint, Supervisor, Occupation and Accident Statistics, Statistical Bureau, Metropolitan Life Insurance Company.

One of the most important tools in promotion of safety has been the concept of an accident rate based on the number of accidents per period of exposure. The use of the accident rate provides a valuable yardstick for measuring the performance of a single fleet from month to month and from year to year and for the comparison of the performance of one fleet with that of another.

To be a reliable yardstick, however, rates must be based on clearly defined rules relating to the classification of occurrences as either motor vehicle fleet accidents or other incidents, and these rules must be consistently applied within the organization and uniformly applied where several organizations desire to compare rates.

A number of different associations and industry groups have, over the years, developed slightly differing rules for the classification of accidents and computation of accident rates. The new standards have sought to resolve these differences and develop uniform methods that all motor

vehicle fleets can use to their mutual benefit.

These methods are independent of Federal, state, county, or municipal requirements for the reporting of motor vehicle accidents for traffic engineering, regulation, or legal purposes. The standards do not attempt to fix blame or driver responsibility, and are not intended as bases for recognizing driver performance for award plans, etc.

The full titles of the standards are:

Method of Recording and Measuring Motor Vehicle Fleet Accident Experience, D15.1

Method of Recording and Measuring Motor Vehicle Fleet and Passenger Accident Experience, D15.2

## Job Openings

The Ordnance Ammunition Command, a procurement agency of the Ordnance Corps, Dept. of the Army, needs statisticians for positions of responsibility in a reliability and quality evaluation organization. Successful applicants will be involved in the estimation of quality levels, the prediction of reliability of ammunition, including sophisticated types of weapons, and the development and application of new and more complex quality assurance techniques. A high-speed computer is extensively employed for data processing and for the solution of complex problems. Starting salaries range from \$5355 to \$8955 per annum. Interested persons should write to:

Commanding Officer  
Ordnance Ammunition Command  
Attn: ORDLY-AIE, R.A. Banzhaf  
Joliet, Illinois

The Market Surveys Branch, Statistical Reporting Service, U.S. Dept. of Agriculture, has vacancies for social scientists in its program of marketing research and program evaluation. Applicants are invited who have some background in psychology or sociology, and experience in survey methods. Salaries range from \$7,560 through \$10,635.

Applicants should submit Standard Form 57, "Application for Federal Employment," to Trienah Meyers, Statistical Reporting Service, USDA, Washington 25, D. C. Telephone DUDley 8-3487.

# INTERNATIONAL STATISTICAL ACTIVITIES

## 1961 ISI Meeting

The 33rd Session of the International Statistical Institute will be held in Paris from August 29 through September 6, 1961. The condensed provisional program is shown below. For full details of the complete program and other attractions of the meeting, write to the International Statistical Institute, 2 Oostduinlaan, The Hague, Netherlands.

### I GENERAL MEETINGS

#### 1. *Present status of statistics in the sciences*

M. S. Bartlett (U.K.), Allyn Kimball (U.S.A.), Boyd Ladd (U.S.A.).

#### 2. *Model Building*

H. C. Cramér (Sweden), H. R. van der Vaart (Netherlands), H. von Schelling (U.S.A.), L. S. Gephart and W. W. Wolman (U.S.A.).

### II INVITED PAPERS MEETINGS

#### 3. *Production, income and financial flows in national accounts*

H. Bartels and G. M. W. Fürst (Germany), R. Stone (U.K.), J. Denizet (France), J. W. Kendrick (U.S.A.), J. B. D. Derksen (Netherlands), J. Ros Jimeno (Spain).

#### 4. *Food availability and nutrition statistics*

D. F. Hollingsworth (U.K.), H. C. Farnsworth (U.S.A.), S. Zarkovich, S. H. Khamis and E. Said (F.A.O.), P. C. Mahalanobis (India), C. J. Martin (Kenya), V. G. Panse (India), J. B. Youmans (U.S.A.), O. Rauschwalbe (U.S.A.).

#### 5. *Traffic congestion*

J. M. Hammersly (U.K.), discussant: R. Fortet (France), M. Herzog (France), discussant: R. J. Smeed (U.S.A.), Ch. Richter (Germany), discussant: K. Johansen (Denmark). Loue, Olivier, Nahon (France).

#### 6. *Smoking and lung cancer, and associated questions*

E. C. Hammond (U.S.A.), G. Dean (Union of South Africa),

J. Berkson (U.S.A.), H. Stewart (U.S.A.), D. de Castro (Italy), S. Koller (Germany).

#### 7. *Time series and analysis*

E. Parzen (U.S.A.), P. Whittle (New Zealand), J. Durbin (U.K.), discussants for the first three papers: T. W. Anderson (U.S.A.), R. L. Anderson (U.S.A.), U. Grenander (Sweden); M. Allais (France), W. O. Doggett, L. K. R. Han and R. P. Kennel (U.S.A.), G. Morlat (France).

#### 8. *Life testing and reliability*

W. Connor (U.S.A.), H. Solomon (U.S.A.), B. Epstein (U.S.A.) discussants for the first three papers: A. Linder (Switzerland), H. G. Romig (U.S.A.), J. J. Riordan (U.S.A.); F. J. Anscombe (U.K.), M. Zelen (U.S.A.), Gideon Schwartz (U.S.A.).

#### 9. *Data processing*

F. Yates and M. J. R. Healy (U.K.), J. F. Daly and A. R. Eckler (U.S.A.), S. Nordbotten (Norway), discussants for the first three papers: B. Barberi (Italy), K. Szameitat (Germany); R. C. Bose and I. M. Chakravarti (U.S.A.).

#### 10. *Applied statistics training for industry in European countries*

J. Mothes (France), panel: K. Stange (Germany), E. D. van Rest (England), J. Teghem (Belgium), E. Blanco Loizelier (Spain), A. Palazzi (Italy), Norsk Forening for Industriell Kvaliteskontroll (Norway) J. W. Sieben (Netherlands), A. Linder (Switzerland), J. Janko (Czechoslovakia).

## Australia

The STATISTICAL SOCIETY OF NEW SOUTH WALES now has 256 members. The officers for 1960-61 include D. W. Maitland, President; E. W. P. Cunneen, Treasurer; and H. O. Lancaster and R. W. Rutledge, Secretaries.

The Society held ten General Meetings in 1960. The titles of papers read at these meetings are given in the November 1960 issue of the

Society's Journal, *The Australian Journal of Statistics*, together with titles of papers read at nine meetings of the Market Research Section and five meetings of the Operations Research Section.

## France

The following papers were presented at meetings of the STATISTICAL SOCIETY OF PARIS during 1960.

Indexations licites, indexations interdites, indexations tolérées, Georges Malignac. January 20.

La prévision à court terme dans l'industrie et le commerce, Henry Antony. February 17.

Problèmes de la statistique hospitalière, Jean Estève. March 16.

Une enquête par sondage sur la structure des familles, Maurice Febvay, April 27.

Différentes applications statistiques de la théorie des valeurs extrêmes, Daniel Dugué. April 27.

L'âge mûr de la Comptabilité Nationale, Edmond Malinvaud. June 15.

Conditions de résidence et de logement des personnes âgées, Gabriel Chevy. October 19.

Opinions économiques inédites de Napoléon, Jean Bourdon. November 16.

—*Journal de la Société de Statistique de Paris.*

## India

The INDIAN SOCIETY FOR QUALITY CONTROL (ISQC) held its annual general meeting on November 27, 1960, with Shri M. L. Shah, president of the society, in the chair.

In collaboration with the Statistics Department of the Calcutta University, the ISQC conducts an annual Training Course in Statistical Quality Control, drawing students from various types of industries.

The ISQC publishes a journal, the *I.S.Q.C. Bulletin*, devoted to the study of statistical quality control problems of technical interest in industry. Technical advisory services to industry are provided by the Society through a Technical Board.

In 1953-54, there was organized the Calcutta Group of the ISQC, whose activities include lecture meetings, discussion groups, and advisory assistance to industry (through the ISQC Technical Board). — *Indian Society for Quality Control.*

## Ireland

The proceedings of the 113th session (1959-60) of the STATISTICAL AND SOCIAL INQUIRY SOCIETY OF

IRELAND have been published in the *Society's Journal*. The following papers were read at Dublin meetings:

1. The Extent of the Potato Crop in Ireland at the Time of the Famine, P. M. A. Bourke.

2. Some Social and Economic Aspects of Housing—an International Comparison, P. O. h-Uiginn.

3. The Economic Utilization of Grassland, R. O'Connor.

4. Some Aspects of the Industrial Capital Market in Ireland, C. H. Murray.

5. An Analysis of Government Revenue and Expenditure in Relation to National Accounts, J. B. Broderick.

6. Presidential Address: Providing for Old Age through Private Channels, W. A. Honohan.

—*Journal of the Statistical and Social Inquiry Society of Ireland.*

## Italy

The CENTRO ITALIANO STUDI E RICERCA (CISER) is publishing, from April 1961, a quarterly magazine dealing with market and marketing research. The journal, *Studi e Ricerche*, will be divided in four parts: articles (technical and methodological), brief articles on practical experiences in Italy and foreign countries, information, and reviews of books and journal. Articles will be published in Italian or English, an article in one language being accompanied by a summary in the other.

Additional information may be obtained from CISER, Via N. Paganini, 7, Rome.

## Korea

The KOREAN STATISTICAL ASSOCIATION has announced its officers and Board of Directors for 1961-63. The President is Mr. Soon-Eung Chung, Chairman of Steering Committee, House of Councilors, ROK. Mr. Byung-In Chang is Vice President, and Mr. Young-Jo Han is Secretary. There are eight Directors.

The Executive Director of the Association is Professor Seung Jae Koh, Seoul National University. The Permanent Executive Director is Mr. Seok-Wan Koh, Assistant Chief for Statistical Standards, Bureau of Statistics, Ministry of Home Affairs, Republic of Korea.—*Korean Statistical Association, Seoul.*

## USSR

The SIXTH CONFERENCE ON PROBABILITY THEORY AND MATHEMATICAL STATISTICS was held September 5-10,

1960, at Vil'nius, sponsored jointly by the Academy of Sciences of the Lithuanian SSR, the Vil'nius State University, and the Steklov Mathematical Institute.

Following the Conference a COLLOQUIUM ON DISTRIBUTIONS IN INFINITE-DIMENSIONAL SPACE was held September 12-14, at Palang.

Chairman of the arrangements committee for the Conference was I. P. Kubilius, and V. A. Statulavičius was secretary.

The program included plenary sessions of three or four papers each on Limit Theorems, Markov Processes, Information Theory and Applications, and Game Theory and Queuing Theory.

Additional sessions were held on the following topics: Limit theorems (15 papers), Mathematical statistics (13 papers), Markov processes (14 papers), Applications (8 papers), Information theory and applications (13 papers), Game theory and queuing theory (10 papers), and Problems of table-making (3 papers).

Twelve papers were presented at the Colloquium.

The programs of both meetings are given in the March 1961 issue of *Teoriia Veroiatnostei i ee Prime-neniia*.

## United Kingdom

The following papers were presented before meetings of the ROYAL STATISTICAL SOCIETY during the 1960-1961 Session.

### Ordinary Meetings

1. The natural law in the social sciences, M. G. Kendall. 16 November.
2. The comparison of male and female mortality rates, R. H. Daw. 14 December.
3. Operational research, K. D. Tocher. 18 January.
4. Research on mail surveys, Christopher Scott. 15 February.
5. An experiment in the marking of an examination, D. V. Lindley. 15 March.
6. The intercorrelation between the nutrients consumed by a group of families in the Netherlands, E. F. Drion, and Diets of bank clerks, J. A. Heady. 19 April.
7. An appraisal of hunger and the world's future needs in food supplies, P. V. Sukhatme. 17 May.

### Research Methods Meetings

1. Consistency in statistical inference and decision, C. A. B. Smith. 5 October.
2. A queuing model for road traffic flow, A. J. Miller; Delays on a two-lane road, J. C. Tanner. 7 December.

3. A test of homogeneity of means under restricted alternatives, D. D. J. Bartholomew. 1 February.

4. Optimal programmes for varietal selection, R. N. Curnow. 12 April.

### Manchester

The following papers were read before the MANCHESTER STATISTICAL SOCIETY, during the 1959-1960 session.

Some basic problems for economists and statisticians arising from United States agricultural policies, Glenn L. Johnson. 11 November.

The causes of business fluctuation, D. J. Coppock. 9 December.

Forecasting in synthetic fibres, H. W. Morris. 13 January.

Changes in the use of institutions in England and Wales between 1911 and 1951, B. Abel-Smith and R. Pinker. 10 February.

The measurement of share values from the investor's point of view, H. E. Wadsworth. 16 March.

These papers have been published in the *Transactions of the Manchester Statistical Society*, together with summaries of six papers presented to the Industrial Group and five papers presented to the Group for the Study of Economic Statistics.

### West Africa

In June, 1960, the United Nations ECONOMIC COMMISSION FOR AFRICA sponsored a Study Tour of Statisticians and Census Officers from West African countries to Ghana, to study the Ghana Population Census techniques and to observe the taking of the Post Enumeration Survey. Twelve representatives from ten countries took part in the Tour.

The first four days were devoted to talks and discussions on the planning, preparation and techniques of the Ghana Census and participants were also afforded the chance of observing the last stages of the training program for interviewers taking part in the Post Enumeration Survey. During the five subsequent days, the participants visited field operations of the Post Enumeration Survey in the various regions and, on the night of June 12th, they watched the night enumeration of the floating population (outdoor sleepers) in Accra.

In the third period, impressions from the field were discussed and

participants from various countries gave experiences in the field of collection and evaluation of demographic data in their own countries. In the last days the participants visited various sections of the Census Office for detailed examination of specific areas of interest to them.

Mimeographed summaries of talks and of some of the discussions have been assembled by the Census Office, Accra, in a volume entitled *Study Tour of West African Statisticians*. The program of the Study Tour was arranged by Dr. B. Gil (United Nations Population Census Expert in Ghana), Mr. P. S. Menon, Demographer (United Nations Economic Commission for Africa) and Mr. J. Riby-Williams (Field Organizer, Census Office, Accra).

WEST AFRICAN TRAINING CENTER in Population Census Techniques, was opened on March 15, 1961, under the joint sponsorship of the UN Economic Commission for Africa, the Republic of Ghana, participating governments of West Africa, and the UN Bureau of Technical Assistance Operations. Information concerning the program of the training center may be obtained from Dr. B. Gil, UNTAB, P. O. Box 1423, Accra, Ghana.

### EOQC Conference

The fifth international conference of the EUROPEAN ORGANIZATION FOR QUALITY CONTROL (EOQC) will be held in Turin, September 11-14, during the period (May-October 1961) of the centenary celebration "Italia 61" commemorating the unification of Italy.

The EOQC program will include about 10 papers by speakers from European countries and the U.S.A., a panel discussion of case studies, and a variety of plant visits. The full program and further information may be obtained from: Kwaliteitsdienst voor de Industrie, Weena 700, Rotterdam, The Netherlands.

### Paris Teletraffic Congress

THE THIRD INTERNATIONAL CONGRESS ON THE APPLICATION OF PROBABILITY TO TELEPHONE TRAFFIC PROBLEMS will be held in Paris, from

September 11-16, 1961. The Ministry of Posts and Telecommunications of France will be host to the meetings in Salle du Congrès du Ministère.

Papers are invited on problems of waiting lines, Monte Carlo methods and simulation, measurement of traffic flow, daily and seasonal variations in loads, load prediction, maintenance studies, service criteria, routing plans, network analysis, optimal dimensioning of plant, programming, and other applications of operations research methods. Also to be considered at the Congress will be the formation of a permanent International Society for Teletraffic Theory.

Inquiries may be directed to the Secretariat of the Organization Committee, Third International Teletraffic Congress, 20 Avenue de Segur, Paris 7. Or North Americans may write R. I. Wilkinson, Bell Telephone Laboratories, 463 West Street, New York 14, New York.

### Social Security Actuaries

The first meeting of the AMERICAN REGIONAL COMMITTEE OF SOCIAL SECURITY ACTUARIES AND STATISTICIANS, established by the International Social Security Association and the Inter-American Committee on Social Security, in cooperation with the International Labor Office, was held in Buenos Aires, Argentina, April 24-29, 1961.

The meeting had two major items on its agenda: methods of financing social security and the practical application of a minimum program of social security statistics. There was discussion of a proposed questionnaire dealing with each subject that would be circulated among the various countries. The original forms of the questionnaires were discussed and revisions suggested.

At the time of the meeting, some of the persons in attendance organized a new informal professional organization, the INTER-AMERICAN ASSOCIATION OF SOCIAL SECURITY ACTUARIES, for the purpose of developing closer personal relationships between actuaries and others in related work in the American continent.—Dr. Robert J. Myers, *Social Security Administration*.

## FEDERAL STATISTICAL ACTIVITIES

### New Labor Dept. Office of Automation and Manpower

The Secretary of Labor has established a new Office of Automation and Manpower to stimulate and coordinate the work of the various bureaus in this field and to work with labor, management, and other Government agencies concerned with the problem.

The new office begins with the basic premise that continued technological change in general and automation in particular are fundamental to aspirations for economic growth in this country, as well as to our posture vis-à-vis the rest of the world. By the same token, it is considered necessary to take all possible steps to mitigate and even prevent as far as possible the impact of these changes on people, especially in terms of unemployment.

Specifically, the Secretary has instructed the new office to (a) examine employment and unemployment by industry, occupation, and area; to obtain information on current and anticipated technological changes and all phases of technological unemployment; (b) to develop programs for expanding and improving testing, counseling, training and placement for new as well as experienced workers in the light of changing demands resulting from automation and other technological changes; and (c) to serve as a clearinghouse for materials dealing with various aspects of the problem and to conduct conferences with employers and workers affected by automation and technological developments.

Plans are now being set for programs along these lines for fiscal year 1962 in consultation with an Advisory Committee on Automation and Manpower appointed by the Secretary, consisting of 24 representatives of Government, industry, labor, and education and industrial relations. This Committee held its first meeting on May 24, 1961.—*Seymour L. Wolfbein, Deputy Assistant Secretary of Labor*

### Publication Program of the Major Censuses

Brief summaries of the contents and release dates of the reports of

five of its major censuses are available upon request from the Bureau of the Census, U.S. Department of Commerce. Statements for each of the publication programs have been issued for the 1958 Census of Business, 1958 Census of Manufactures and Mineral Industries, 1959 Census of Agriculture, 1960 Census of Population, and the 1960 Census of Housing.

The 1958 Census of Business reports cover retail trade, wholesale trade, and selected services. Separate series for each of these trade segments comprise a report for the United States as a whole and a report for each State. Each State report includes statistics for smaller geographic units. Other series deal with specific subject fields. Data are also presented for public warehousing. The rapid growth of retail shopping centers has created special interest in the Central Business District series of 98 individual reports. These reports include, for the first time, statistics on major retail shopping centers in addition to data for central cities, central cities exclusive of the central business districts, the standard metropolitan statistical areas, and the standard metropolitan statistical areas exclusive of the central business districts.

The 1958 Census of Manufactures and Mineral Industries program includes series of reports by industry, by geographic area, and by subject for both manufactures and mineral industries. This program also includes reports on Distribution of Manufacturers' Sales by Class of Customer, Production Indexes, and Location of Manufacturing Plants.

The publication program for the 1959 Census of Agriculture includes a volume of special reports. According to present plans, Volume V—Special Reports will comprise: Part 1, Horticultural Specialties; Part 2, Farm Taxes and Farm Mortgage Debt; and Part 3, 1960 Sample Survey of Agriculture. Other publications scheduled are: Vol. I, Counties (a report for each State, Puerto Rico, Guam, Virgin Islands, and American Samoa); Vol. II, General Report (Statistics for 14 subjects for the United States, geographic regions and

divisions, and for States); Vol. III, Irrigation of Agricultural Lands (Part 1, Western States and Part 2, Eastern States); and Vol. IV, Drainage of Agricultural Lands.

The final population counts of the 1960 Census of Population will be issued in two formats. The counts for each State (or possession) have been issued as a chapter A, Number of Inhabitants, in the form of a separate report for each State, the District of Columbia, the United States, Guam, Virgin Islands, American Samoa, and the Canal Zone. Each of the chapter A reports will subsequently be bound with three other chapters for each State—Chapter B, General Population Characteristics; Chapter C, General Social and Economic Characteristics; and Chapter D, Detailed Characteristics—as a numbered part of volume I under the title, Characteristics of the Population. In addition, the chapter A reports for all States will be assembled and bound in buckram as Volume I, Part A, Number of Inhabitants.

Other final reports include: Vol. II, Subject Reports (a series of 40 reports on such subjects as race, fertility, migration, education, occupation, income, and others); Vol. III, Selected Area Reports; Vol. IV, Summary and Analytical Report; and Census Tracts (about 175 reports on population and housing for "traced" areas). A special series of supplementary reports is also being issued. These reports will present special-use statistics which do not appear in the regular series of final reports, data issued in advance of Volumes II and III, and reprints of selected tables.

Another feature of the 1960 publication program will be a 36-page supplement of charts, graphs, and maps which will be issued as part of the United States summary for the Chapter A reports and in Volume I, Part A and Part 1.

Six volumes of final reports are planned for the 1960 Census of Housing. Reports will first be issued separately for States and other areas and will subsequently be assembled and bound for broad geographic and subject groupings. These volumes and their titles are: Vol. I, States and Small Areas (55 reports giving data for each of the 50 States, the District of Columbia, the Virgin Islands, Guam, and Puerto Rico, and a United

States summary); Vol. II, Metropolitan Housing (about 197 reports including a separate report for each standard metropolitan statistical area with 100,000 inhabitants or more and for the United States by geographic divisions); Vol. III, City Blocks (housing data by blocks for each city or urban place of 50,000 inhabitants or more); Vol. IV, Components of Inventory Change; Vol. V, Residential Finance; and Vol. VI, Rural Housing, Economic Subregions. The publication program also includes Census Tracts (joint reports on population and housing), and a special series of reports for local housing authorities.

The first of the 421 reports in the City Blocks series has already been issued. This series will present data for 750,000 city blocks. In addition to those places meeting the population criterion stated above, city block data will also be issued for a number of localities with smaller population which requested and paid for special coverage in this series.

Two procedural studies of particular interest to users of census data are: Principal Data-Collection Forms and Procedures, and the Geographic Identification Code Scheme.

The forms and procedure publications present the principal enumeration forms and descriptions of the field procedures used. One report, covering the 1960 Censuses of Population and Housing, has already been released. Similar reports on the 1959 Census of Agriculture and the Survey of Components of Change and Residential Finance are in preparation.

The Geographic Identification Code Scheme series presents the code system developed for the 1960 Censuses to identify all the political and statistical subdivisions for which data are tabulated. This material has been issued by States, and a United States compilation will be available shortly.

Requests for copies of the statements of the publication programs for the various censuses, and for order forms for report series in print, should be addressed to the Publication Distribution Section, Administrative Service Division, Bureau of the Census, Washington 25, D. C.—*Edwin D. Goldfield, Chief, Statistical Reports Division, Bureau of the Census.*

## Surveys to Evaluate New Food Distribution Programs

The Department of Agriculture has recently undertaken sampling surveys to provide information which will aid in determining the effectiveness of new food distribution plans in improving diets and expanding agricultural markets. The surveys will provide a basis for evaluating the effect of an expansion in the number and kinds of foods donated under the direct distribution program and the introduction of food stamps in lieu of direct food distribution in eight pilot areas. Eligible families, to be certified by local welfare agencies, will be allowed to purchase stamps or coupons for a portion of their face value, the portion to be determined by income status and household size. The stamps will be usable for purchasing most food items in cooperating retail stores. A limited number of foods, including those not in economic surplus and those largely imported, could not be purchased with stamps.

The following types of field surveys are being developed: (1) surveys of food consumption by low-income households; (2) surveys of retail food store sales; and (3) surveys of attitudes and opinions of recipients, food trade representatives, State and local officials, and others concerned with program operations.—*Robert M. Walsh, Economic Research Service, Department of Agriculture.*

## Minimum Wage Studies

Amendments to the Fair Labor Standards Act, recently enacted and effective September 3, 1961, will require a program of surveys involving a wide range of industries. In some cases reports must be made by the Department of Labor to Congress by January 1962.

Section 4(d) of the Act requires the Secretary of Labor to make annual evaluations of the minimum wages established by the Act, and to submit to the Congress recommendations for its improvement. The studies required by this section must be supplemented to provide a basis for evaluating minimum wages applicable to 3.6 million newly covered workers. The amendments also specifically require that a number of additional studies be made by the Secretary of Labor, and that reports and recommendations be submitted to the Con-

gress in January 1962. These specific reports include studies of hotels, motels, restaurants and of food service workers in other establishments, and a study of the exemptions applicable to the handling and processing of agricultural commodities. The Department has also indicated to the Congress that it will conduct a study of laundry and cleaning plants.

The studies will be conducted under the general direction of the Wage and Hour Division of the Department of Labor. The Bureau of Labor Statistics will conduct all but one of the surveys needed to carry out the Act's requirements. The Statistical Reporting Service of the Department of Agriculture has been requested to conduct the survey of the exemptions applicable to the handling and processing of agricultural commodities.

The basic approach used in studying the effects of minimum wages is to obtain information for a period prior to the effective date of a minimum wage change, and then to obtain corresponding data for one or more periods following the effective date of the change. To the extent feasible, the survey plan should also provide information which will aid in determining to what extent the changes disclosed by the surveys are an effect of the minimum wage rather than the result of other factors.

In previous studies emphasis was placed on effects on wages and employment of currently protected employees. The studies to be initiated in fiscal year 1962 will be of a more comprehensive nature, and will include information on the effects of the provisions of the 1961 amendments for extension of coverage to workers in retail trade and other industries.—*Max Schifertl, Director, Division of Regulations and Research, Wage and Hour and Public Contracts Divisions, U. S. Department of Labor.*

## 1959 County Business Patterns

"County Business Patterns, First Quarter 1959" is now being printed in 15 separate parts which are being released as ready. These reports present data on first quarter 1959 payrolls taxable under the Old-Age, Survivors, and Disabilities Insurance (OASDI) program; number of employees as of mid-March 1959; and

distribution of reporting units by employment size for all nonfarm commercial and industrial activities and nonprofit organizations covered by the OASDI program.

Two new features are introduced in this edition of *County Business Patterns*. The first is the presentation of substantially more industry detail than was shown before. The second new feature is the inclusion, within the appropriate industry classifications, of data for nonprofit organizations covered under the elective coverage provisions of the Social Security Act.

"County Business Patterns, First Quarter 1959" is the ninth in a series of publications showing first quarter county and industry statistics. It is a statistical by-product derived from OASDI administrative reports used with Census of Business, Manufactures, and Mineral Industries reports and a special survey of multiunit companies conducted by the Census Bureau.

All reports may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. An announcement and order form describing all reports in this series is also available from the Publication Distribution Section, Bureau of the Census, Washington 25, D. C.

The *County Business Patterns* reports and prices are as follows:

Part 1. United States Summary.....	\$1.25
Part 2. New England States.....	1.00
Part 3. Middle Atlantic States:	
A. New Jersey, New York ..	1.00
B. Pennsylvania ..	.75
Part 4. East North Central States:	
A. Michigan, Wisconsin ..	1.25
B. Illinois, Indiana, Ohio ..	1.75
Part 5. West North Central States:	
A. Iowa, Minnesota, Missouri ..	1.50
B. Kansas, Nebraska, North Dakota, South Dakota ..	1.50
Part 6. South Atlantic States:	
A. Delaware, District of Columbia, Maryland, Virginia, West Virginia ..	1.25
B. Florida, Georgia, North Carolina, South Carolina ..	1.75
Part 7. East South Central States ..	1.75
Part 8. West South Central States:	
A. Arkansas, Louisiana, Oklahoma ..	1.25
B. Texas ..	1.00
Part 9. Mountain States ..	1.50
Part 10. Pacific States ..	1.50

—Saul Hern, Bureau of Old-Age and Survivors Insurance, and Louis Greenberg, Business Division, Bureau of the Census.

## Among Recent Publications

The following publications are available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

*Department of Agriculture, Economic Research Service*

Output Per Man-Hour in Factories Processing Farm Food Products (Technical Bulletin 1243, 36 pp., 20¢)

*Department of Commerce, Bureau of the Census*

The Labor Force of Rumania (International Population Statistics Reports, Series P-90 No. 14, 33 pp., 25¢)

*Federal Aviation Agency*

FAA Air Traffic Activity for calendar year 1960 (156 pp., 75¢)

General Aviation in Alaska (12 pp., 10¢)

*General Services Administration*

Forms Analysis (Revised May 1960, 62 pp., 40¢)

Forms Design (Sept., 1960, 88 pp., 45¢)

*Interstate Commerce Commission*

Cost of Transporting Freight by Class I and Class II Motor Carriers of General Commodities, Central Region, 1959 (Statement No. 1-61, 35¢)

*National Science Foundation*

Professional Manpower and Education in Communist China, by Leo A. Orleans, (260 pp., \$2.00)

Current Projects on Economic and Social Implications of Scientific Research and Development, 1960. (NSF 60-79, 124 pp., 40¢)

*U.S. Congress, House Committee on Veterans Affairs*

Historical Statistics of the Veteran Population, 1865-1960. (Committee Print No. 69, can be obtained by writing to the Committee)

## PERSONAL NEWS

RONALD H. BEATTIE, Chief of the California State Bureau of Criminal Statistics, left State service on March 31, 1961, in order to accept the position of Chief of the Division of Procedural Studies and Statistics with the Administrative Office of the United States Courts.

DALE BERMAN, economist and statistician with H. Zinder & Associates, Inc., Utility, Oil and Gas Consultants, has been promoted from Lecturer to Professorial Lecturer in the Department of Mathematics and Statistics of The American University, Washington, D. C. where he is currently teaching several courses in business statistics.

STANLEY K. BIGMAN, formerly Director, Office of Social and Environmental Research, Gallaudet College, has joined the Division of Program Statistics and Analysis, Bureau of Public Assistance, Social Security Administration, as a Survey Statistician.

JAMES C. BYRNES, formerly with the Board of Governors of the Federal Reserve System, has accepted a position as Super-

visory Analytical Statistician (Economics) in the Population Division of the Bureau of the Census.

WILLIAM D. CASSIDY, Analytical Statistician in the Statistics Division of the Internal Revenue Service, shared a joint award made in March to two IRS employees. Mr. Cassidy received his award for the determination of the methods used in preparing the new "Average State General Sales Tax Payment Tables," issued for those States having a general sales tax.

LOUIS I. DUBLIN, retired actuary for the Metropolitan Life Insurance Co., now living at Winter Park, Florida, and a former President of ASA, was inducted on March 10 into the Insurance Hall of Fame. The citations and awards of silver medals presented at the 12th annual Insurance Conference at Ohio State University brought to 11 the number who have received the award since it was established in 1957.

DAVID B. DUNCAN, formerly Professor of Statistics at the University of North Carolina, became Professor of Biostatistics at The Johns Hopkins University in January 1961.

JOHN W. ENELL has been appointed Director of Research of the American Management Association. Previously he was Director, Information Service and Surveys.

J. S. HUNTER, formerly with the Mathematics Research Center, U. S. Army, University of Wisconsin, has accepted a position as Associate Professor in the Chemical Engineering Department at Princeton. He continues as Editor of *TECHNOMETRICS*.

EUGENE H. LEHMAN, JR., Instructor at the Statistical Laboratory of Purdue, has passed his Ph.D. examination at North Carolina State College and has been promoted to Assistant Professor. His dissertation was in the field of reliability and life testing.

ELI S. MARKS will be leaving National Analysts, Inc., Philadelphia, to accept an appointment at Case Institute as Associate Professor of Behavioral Sciences.

HENRY S. MILLER, Professor of Economics at Queens College, Flushing, New York, will lecture in economic statistics at Ankara University, Turkey, during the academic year 1961-62 under a Fulbright grant.

BERNARD S. PASTERNAK, formerly Assistant Professor of Biostatistics at the University of North Carolina, is presently Assistant Professor (Biostatistics) in the Institute of Industrial Medicine, New York University Medical Center.

J. N. K. RAO received the degree of Doctor of Philosophy, with a major in Statistics, at the Winter Quarter graduation of Iowa State University.

NICHOLAS RELICH is now Associate Professor of Mathematics and Statistics at Purdue University Extension in Hammond, Indiana, where he handles all statistics and quality control courses. At present Professor Relich is completing a one-year training program in statistics for the United

(Continued on page 31)

# STATISTICAL DOGMA: A CHALLENGE

IRWIN D. J. BROSS, Roswell Park Memorial Institute

In the long run, I think, it is disastrous for statisticians to be dogmatic. Yet modern statistics (especially the theoretic phases) is often dogmatically presented. This may be expedient (eg. confer a short term advantage) in persuading some students or customers that statistical methods are a marvelous invention (and, incidentally, that the person who makes these forceful and sweeping assertions *really* knows his stuff). But when the reaction does come—and it *has* come in areas where statistics was “oversold”—it is equally forceful and sweeping.

The pendulum swings of dogmas also disrupt the progress of statistics. Due to Laplace, Bayesian theories acquired the force of dogma. During the Fisherian reaction Bayes theorem virtually disappeared from statistics texts. Fisher's vigorous and total repudiation is the usual counterreaction to dogma. In the past decade the pendulum has swung again and the new Bayesians are as dogmatic as the old ones.

Let me make clear what I mean by a “dogma”. To me a dogma is a statement (or conceptual system) for which:

- (1) Strong claims are made concerning *real* performance (eg. “truth”, “utility”, etc.)
- (2) Empirical backing for these claims is lacking.

Usually the strong claims are coupled with attacks on the “other side” and strong hints that *only* the “true believers” can be trusted.

A scientific approach is undogmatic. The basis of modern science is the rule: A theory must fit the facts. A scientist is not supposed to make statements unless he has solid empirical backing for them. One of the main roles of a statistician who is working in a scientific area is to help investigators to *test* whether their theories fit their facts. For a statistician who has this role it is not merely paradoxical to adopt a dogmatic attitude—it is almost suicidal.

Since my statement about the Neo-Bayesians may sound dogmatic let me cite a little evidence. I have taken the quotations below from F. J. Anscombe's “Bayesian Statistics” (THE AMERICAN STATISTICIAN, 15, 1, Feb., 1961). I am “picking on” Anscombe (rather than some others of this school) because I have found him to be a most undogmatic *person*.

First as to claims (two will, I think, suffice):

- (1) For the Bayesian Statistician “‘probability’ really means probability” while the relative frequency viewpoint “bears little resemblance to what the man in the street means (rightly) by probability.”
- (2) “When the problem is one of unique intelligent decision . . . often only the Bayesian can illuminate and assist the workings of common sense.”

Second, as to empirical backing. The only statement I can find with some bearing is: “Whenever, as here, the results of applying the Bayesian method can easily be compared with intuition and common sense, the agreement is good.” This statement is a bit surprising coming from someone who, I suspect, would be able to cite (offhand) some 10 or 20 references to Bayesian arguments that led to contradiction and paradox. But in any event the statement sets up a link to opinion rather than fact.

Note that the above quotations all refer to a *conceptual system* (specifically one employing “subjective probability”) and are not isolated dogmatic statements such as we are all prone to make. In fairness to Anscombe I might add that it would be easy to repeat this process using quotations from some of the “orthodox” or “relative frequency” school. There is a tendency to fight dogma *with* dogma and when this happens we often see the pendulum swings noted earlier. These oscillations are “damped” by a factual brake.

Why is there considerable dogma in theoretical statistics when *any* dogma would be incongruous? I suspect this is because a mathematical statistician has to switch back and forth between two different sets of standards for the judgment of his work. Insofar as his results constitute an *abstract* symbol system, the standards of symbolic logic and mathematics apply (eg. is the symbol system *internally* consistent?). Insofar as his results constitute advice for the experimental or applied statisticians the standards of science apply (does the theory fit the real world facts?). It is always hard to serve two masters so this confusion is only to be expected. Of course the theoretic statistician can renounce the real world and function “purely” as a mathematician—and some do. But if the theorist wants to make statements about the real world (as in Anscombe's paper) *he has no special exemption from the requirement that his theories must fit the facts*. Theorists seem strangely unaware of this point.

Even a cursory look at the facts goes far toward clearing up the confusion about Bayes theorem. *If* this theorem is taken as a formal (or purely mathematical) statement *then* there is no real question. Bayes theorem can be strictly derived from almost any of the axiom systems for probabilities that have been suggested. It is when the theorem is taken as applicable to *real* problems that a thorny question arises. Bayes theorem contains certain symbols (sometimes called “prior probabilities”) and the question is: Do these symbols correspond to anything that is observable in the real world?

This question can be dodged by introducing the symbols in axioms or definitions but eliminating them

in the theorems (which is what Wald did with the minimax criterion). This is an accepted practice in science where axioms may involve quantities which cannot be directly observed (eg. electrons) but the theorems or predictions deal with observables. In statistics, parameters are frequently introduced which are subsequently eliminated in the theorems.

In certain applications (notably in sampling inspection of mass-produced articles) the "prior probabilities" can be interpreted in terms of observable processes and indeed can be estimated in the same way as the usual ("posterior") probabilities (from records kept on incoming lot quality over a period of time). This should make it clear that there is nothing *inherently* pathological about the controversial symbols.

The argument therefore centers about situations where there is *no* evident observable distribution to link to the symbols. Here the "orthodox" view is that Bayes theorem (as an *interpreted* formula) becomes useless since there are no *empirically* obtained quantities to substitute for the symbols in the formula. In other words when you have virtually no "prior" information *you say so*—and turn to procedures (e.g. "standard" statistical methods) which do not require this kind of information.

The "subjective" school holds that there really is prior information in all or nearly all cases. However the information is in the form of guesses, intuitions, or fragmentary information in someone's brain. By an *introspective* process this information can be recovered and used in Bayesian formulas. Most Neo-Bayesians go somewhat further and argue that the introspectively derived probabilities are the *only* meaningful probabilities. At this point the "orthodox" statistician, who might have been willing to go part way, is likely to swing back to an extreme position (eg. "Bayes theorem is out"). The "orthodox" statistician might admit the existence of vague prior information—might be willing to argue the question: Is it worthwhile to dilute reliable "posterior" information with the dubious "prior" information?—but to elevate opinions and guesses over observable quantities and facts is just too much for him!

The net result is a controversy that has produced numerous books and articles but, to my naked eye, little visible progress or advance in statistical know-how (though both sides have capable authors). This is the natural state of affairs when dogma meets dogma. However it is not a good example for statisticians to set for their customers!

Yet it would be quite easy to settle the matter *empirically*. The Bayesians claim to have an effective introspective process that leads to better *real* decisions. This is testable. Let us set up two teams—2 "orthodox" and 2 "Bayesian" statisticians. Each person would *independently* write a computer program to simulate a series of

decision situations (such as Anscombe's examples). Each person would also write a computer program for a decision-making procedure (with an option to add in information—say information derived by the introspective process—or to change the program itself during the test). To insure fair play a referee should be permitted to read the programs in advance. The prior probabilities devised by the "orthodox" players should give *some* opportunity for the Bayesians to form guesses or intuitions from fragmentary information. Similarly the prior probabilities of the Bayesians should not be the sort of pathological distributions that are used as counter-examples in decision theory (i.e. are not merely schemes to defeat "standard" statistical methods). Programs should *have* some resemblance to a realistic situation.

The decision programs of player 1 would be tested in the 3 situations set up by the other players. With computers the test could be run off in a day or two (the Orthodox players could play by correspondence). The Bayesian view could be tested in three different ways. Since the Bayesian approach gives both a decision *and* an expected gain (or loss), the observed and expected gains could be compared for each Bayesian player separately. The subjective probability assessments (and overall gains) of the two Bayesians could be compared. Finally the Bayesian gains could be compared to the Orthodox gains. The Orthodox approach could be tested in much the same way (except there might not be a comparison corresponding to the observed and expected gains of the Bayesian players).

Here's a challenge: Would anyone care to play? The more volunteers the better the experiment would be.

I submit that this experiment, while not ideal, would be much fairer than the present practices of the controversialists wherein an author simply cooks up a mathematical model which makes his "side" look good. I, for one, would accept a clearcut Bayesian "victory" as fair evidence that there are introspective processes which can yield useable information which can materially improve decision results. But until this experiment (or a better one) is carried out (and we have some facts) it would be well to refrain from making claims and counterclaims.

A final word. The Bayes controversy is by no means the *only* one that has distracted statisticians from the many major unsolved problems in their field. Indeed nearly all of the controversies that have lasted for, say, more than a decade involve a dogmatic position on at least one side—often on both sides. If statisticians were to practice what they preach—that the acid test of a theory is whether it fits the facts—a way to settle these controversies by *experiment* might be found, if so, we could get rid of much of the dogma that has gotten into modern statistics.

## RANDOM REMARKS

(with some references to Runs of Luck)\*

by J. E. KERRICH, *University of the Witwatersrand*

If we see further than our predecessors did, it is because we stand on the shoulders of giants. This venerable remark rings through my mind on many occasions when teaching, or when trying to survey my subject. I do wish that many of the younger statisticians would find time, or make time, to study the history of our subject to some extent. It gives one a poise, a balance, an insight into the subject that is valuable. The best single book that I can think of which sketches the history of statistics is, curiously enough, Launcelot Hogben's "Statistical Theory." Professor Hogben, like several others who have imprinted their personalities upon our subject would not, I think, claim to be a professional statistician.

In my judgment the statistical giant par excellence was the French Marquis Simon Pierre Laplace. The third edition of his *Theorie Analytique des Probabilités*, published in 1820, lies (unread) on my shelves and forms the foundation stone of such knowledge as I have of my subject.

But my favourite giant is Carl Frederick Gauss, that magnificent mathematician who quite incidentally while earning his bread and butter as a mere astronomer did so much work on the normal law of error and the theory of least squares. The theory of least squares still permeates our subject. To my mind it still forms the hard core on which we build. Our concepts of probability have altered, our knowledge of the sampling distributions of the estimates used has increased and our arithmetic methods have been improved, but the hard core is still there, the core that enabled Gauss, Bessel, Airy, De Sitter and so many others to make sound statistical judgments in the fields of astronomy and surveying without the extra aids that we now possess. As time passes the work of pioneers tends to be overlooked or forgotten, but if we forget some things we revise other topics and I do think that during my lifetime there has been a considerable clarification of the basic concept of probability, and I want to tell you about my own experiences in this field.

It was in 1924 that I was informed that a probability was the ratio of favourable cases to total number of cases, which is a definition that sets our teeth on edge today; in 1929 I puzzled over Laplace's essay on Probabilities and during the thirties I vacillated between authors who proclaimed Bernoulli's theorem as one of the corner stones of human thought because it proved that an observed frequency ratio  $m/n$  tended towards a fixed limit  $p$ , and authors who sturdily

protested that no theorem could prove what would happen when a particular coin was actually spun a large number of times. I corresponded a little with Neyman and heard vaguely of Von Mises and Kolmogoroff without reading anything by either of them.

All this time I was taking more and more interest in statistics and less and less in pure mathematics. So much so that in 1939 I decided to spend a year overseas studying statistics and in 1940 found myself in a civilian internment camp in Denmark for my pains. Cogitating gently during my enforced idleness it occurred to me that here was a chance to find out what I knew about the basic concept used in my chosen subject, and to blaze with what other people had written. So I said "let's pretend that I am tossing the first coin for the first time," and built up a body of experimental data with an ordinary coin, a disc of lead and wood and some ping-pong balls in a cardboard box. The careful examination of the data led to the choice of certain *mathematical models* from which deductions were made which in turn appeared to be reasonably well verified by further observations. In short, a simple mathematical calculus (of probabilities) emerged and at last I knew what I meant by a *mathematical probability* and had a reasonably clear idea as to what it could tell me about certain physical phenomena, a fact which has stood me in very good stead ever since.

Well, time passed, we got home at last and I was able to consult libraries again, and found that what I had written was pure Kolmogoroff. Very much simplified, of course, without any Borel fields or topologies or anything highbrow of that sort, but quite useful to some people.

Now I wish to emphasize that in this work I was not aiming at originality, but merely at clarifying my own mind; just as well that I was content with a limited objective for I did not produce anything really original. In fact, to me the point of this long anecdote is that it illustrates and emphasises how extraordinarily difficult it is to be original and how greatly we are influenced by environment and by what other people in it are doing and thinking. A certain stage in the development of a subject is reached and the work is carried forward by a group of people thinking along the same lines. I see clearly now that even at second and third hand I had been strongly influenced by others and regard my monograph as a small ripple in a wave of progress in motion at that time. On the other hand it is so easy to miss that wave. W. Burnside, for instance, who was an extraordinarily capable mathematician, wrote a book on probability in 1930 which has been republished

\* Adapted from the Popular Evening Lecture, South African Statistical Association Congress, October 1960.

in the Dover series, in which to my mind he missed that wave by a hairsbreadth, but missed it very completely. The grim thought occurs to me that very likely I, and possibly some of you, have missed the next few waves and are in stagnant waters.

After 1945 I became involved in many applications of mathematical statistics to practical problems. Most of you know what this entails. You are landed with a set of observations and live with them. You tabulate them and graph them and build this mathematical model and that mathematical model, you work out confidence intervals and apply tests of significance, you go back to your colleagues who gave you the data and find out everything you can about what they know or think they know about the problem, and finally if you are lucky your ideas crystallise and you come to a firm decision and write your report with considerable confidence.

I have watched my mental processes in coming to these decisions with considerable care and curiosity and with mighty little success. Put it this way: I know something about *mathematical* probabilities, and use my knowledge as part of the evidence studied when trying to reach a decision, but I feel that in weighing the evidence I am doing something that might be termed employing non-mathematical probabilities. Exactly what my mental processes are I do not know, but here is a quotation from E. Parzen's new book "Modern Probability Theory and its Applications" which may throw some light on what I am trying to say.

"The nature of probability theory is a subject about which competent men differ. There are at least two main classes of concepts that historically have passed under the name "probability." It has been suggested (by R. Carnap) that one distinguish between these two concepts by calling the one "probability<sub>1</sub>" and the other "probability<sub>2</sub>". The theory of probability<sub>1</sub> is concerned with the problem of inductive inference, with the nature of scientific proof, with the credibility of propositions given empirical evidence and in general with ways of reasoning from empirical data to conclusions about future experiences. The theory of probability<sub>2</sub> is concerned with the study of repetitive events that appear to possess the property that their relative frequency of occurrence in a large number of trials has a stable limit value."

I think that this is a very valuable distinction and will go a long way towards avoiding the obscurities and crass contradictions that plagued my life earlier. Though I don't know much about probability<sub>1</sub>, surely some of you will be able to give us suitable doses of it, in simple language, at future meetings.

Let's get back into somewhat shallower waters. Some time ago I was given a book to review by G. Spencer Brown called "Probability and Scientific Inference." What particularly startled me about it was the claim on the blurb that in this book "the question of luck is seriously treated for the first time." Checking this led me to Chapter 3 of the second edition of that delightful book "An Introduction to Probability Theory and its Applications" by W. Feller, in which he

deals with runs of luck. Here I found references dating back to 1887, theory admirably explained and some fascinating results. I have been looking for an opportunity to talk about them, and you are going to be my little victims.

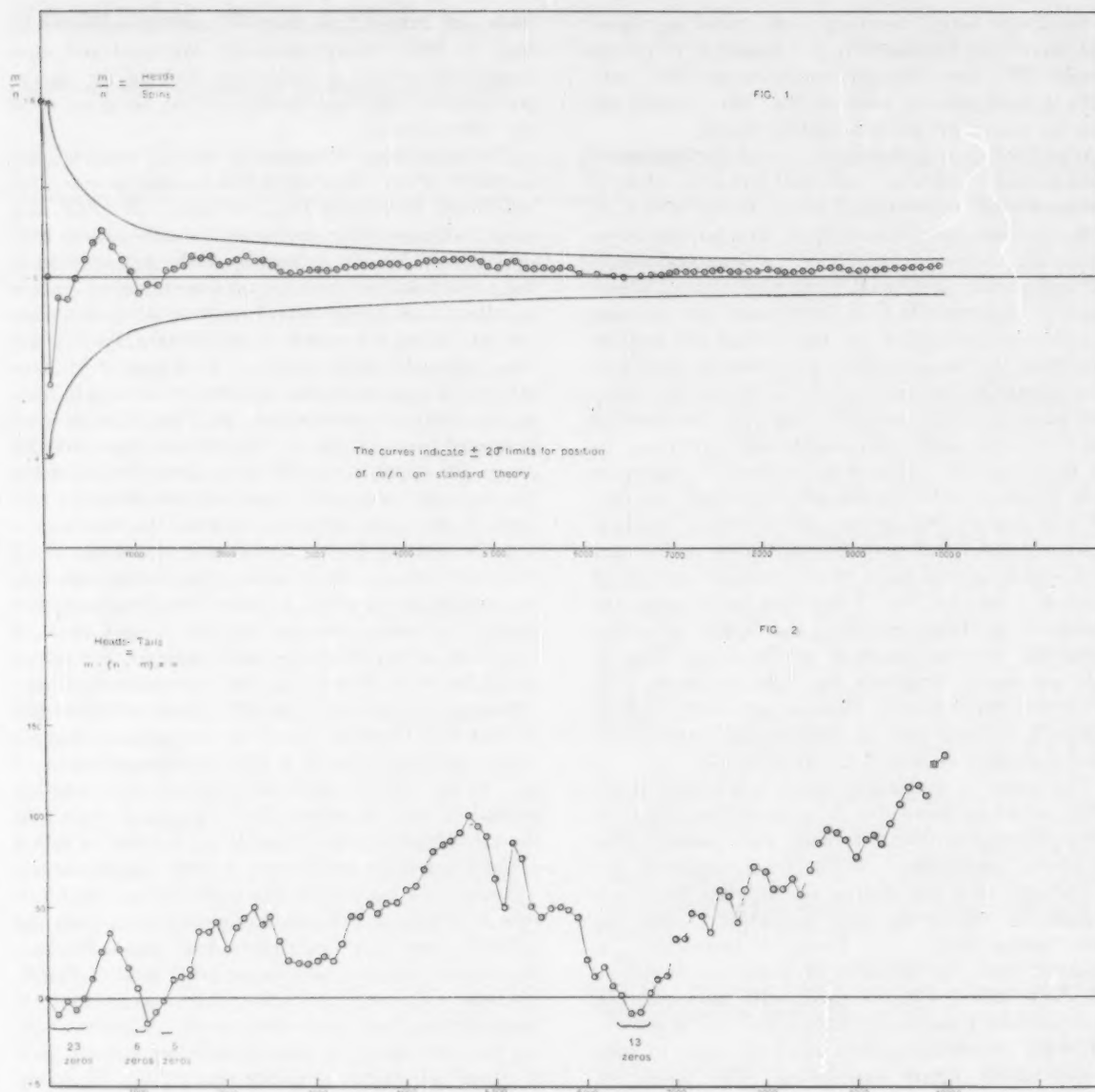
The subject can be treated in terms of a simple game played by Peter and Paul in which a coin is spun. If it falls heads Peter pays Paul one penny. If it falls tails then Paul pays Peter one penny. Sounds awfully dull, does it not? The data given by Feller are artificial in the sense that they are built up from tables of random numbers. I felt happily that I could do better than that and turned up the records of my 10,000 spins of a real coin, obtained while interned. In Figure 1, I have attempted to graph the behaviour of  $m/n$  = heads/spins in this series of observations. All I can show is what happened for  $n=0, 15, 50, 100, 200$  and thereafter for every 100 up to  $n=10,000$ . So a great deal of detail has been lost, especially concerning the minor fluctuations in  $m/n$  that occurred between the values of  $n$  actually plotted. For example,  $m/n = \frac{1}{2}$  exactly on 47 occasions, whereas the diagram suggests that this only occurred about eight or ten times. However, the correct general impression remains and the largest value of  $m/n$  that occurred in this series namely  $\frac{9}{15} = 0.6$  at  $n=15$  has been shown. The two curves marked have equations  $y = \frac{1}{2} \pm \sqrt{1/n}$  and give limits within which, on standard binomial theory for an unbiased coin we expect, for each value of  $n$ , 95% of observed values of  $m/n$  to lie. All the observed values of  $m/n$ , whether plotted or not, lie within these bounds. *I claim that there is nothing to suggest that we are not dealing with a perfectly ordinary coin behaving in quite a usual manner.*

Now that I have made this point quite clear, let us turn to Figure 2 and regard the same data from the point of view of a Peter plays Paul game. For any particular value of  $n$  the accumulated total of Peter's winnings (or losses) up to that stage is given by total heads minus total tails =  $2m - n = W$ . Whenever this has the value zero, the players have tied and are back to where they began, or so one would think. There are of course 47 ties in this set of data, corresponding to the 47 occasions on which total heads equalled total tails and  $m/n = \frac{1}{2}$ .

Once again, I cannot plot all the information and have contented myself with plotting Peter's "winnings" for  $n=0, 100, 200$  and so on up to  $n=10,000$ . As in Figure 1 considerable minor fluctuations took place between each pair of points plotted.

So much is this so, that between  $n=0$  and  $n=400$  there are 23 zeros that I have not been able to plot. During the time that it took to make these 400 spins, one can say that there were small gains and losses on either side, and the luck was evenly divided—"As we would expect," one feels inclined to say.

But now, starting at  $n=283$  when 11 points down, the picture alters and for over 400 spins the luck seems to be very consistently in favour of Peter until at  $n=715$  he is 43 points ahead. Then the luck changes, until at  $n=1089$  Paul is 19 points ahead. And so the



process continues with wider and wilder fluctuations of fortune until finally from being 13 points down at  $n=6607$  we leave Peter 134 points ahead at  $n=10,000$ , almost 3400 trials later!

Fantastic, isn't it! I used to regard my wife's complaints that "she never won at bridge" with mild skepticism, but if it was made towards the end of a run of bad luck of similar magnitude I think she deserves our sympathy.

The results given in Feller's book on p. 84 are very similar to the ones given here. Commenting on his results Feller says "When looking at the graph most people feel surprised at the length of the waves between successive crossings of the  $x$  axis (i.e. successive changes of lead). Nevertheless the graph represents a comparatively mild case history and was chosen as the mildest among three available records." Earlier, on

p. 68 he says "If coin tossing proceeds at a uniform rate common sense expects that with due allowance for chance fluctuations a two-day game should produce twice as many ties as a one-day game. In other words, we expect intuitively that the number of ties will increase roughly in proportion to the duration of the game. Paradoxically this is not so. *The number of ties increases as about the square root of time.* In 10,000 tossings the median number of ties is 67, but in 1,000,000 spins increases only to 674; the typical "wave length" increases from about 150 to 1500. "These results come as a shock to intuition and common sense. They reveal that commonly accepted notions concerning chance fluctuations are without foundation and that the implications of the law of large numbers are widely misconstrued."

Another interesting application can be illustrated by

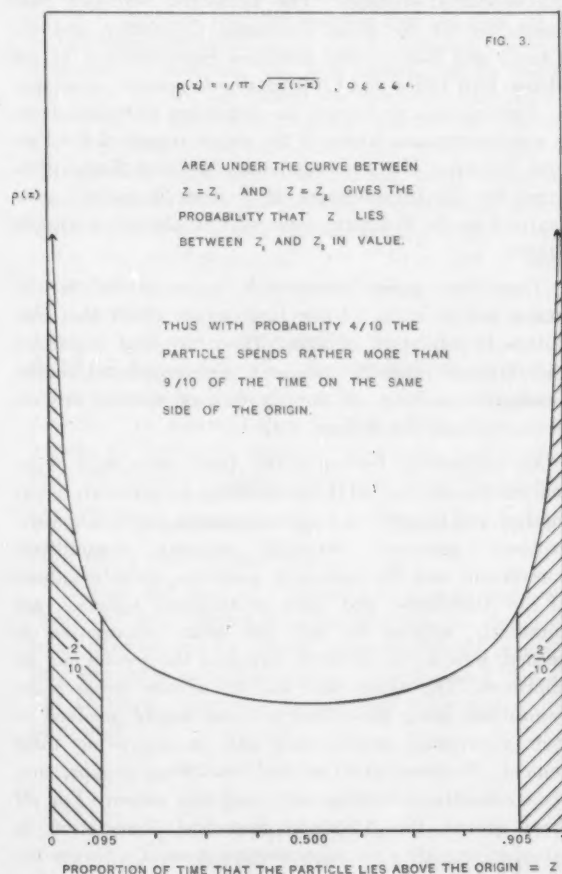
means of Figure 2. Imagine a particle situated at the origin at zero time. One time interval later it receives an impulse which either moves it upwards one unit (with probability one half) or downwards one unit (with probability one half.) This type of situation is called a simple random walk, and Figure 2 gives an idea of one of the many paths that such a particle could follow in  $n = 10,000$  time units.

We might expect that about half the time the particle would lie above its initial position (indicated by the straight line) and half the time below it. In the case shown, the particle lies above the line most of the time. Is this unusual? Not at all, in the light of Feller's comments, and a complete answer expressed mathematically is as follows:—In  $n$  time intervals, let  $z$  be proportion of total time that a particle lies above its initial position on the line. Then as  $n$  increases the probability distribution of  $z$  rapidly approaches the form

$$p(z) = \frac{1}{\pi \sqrt{z(1-z)}} \quad \text{where } 0 < z < 1$$

The graph of this distribution is a magnificent symmetrical U shaped curve. See Fig. 3.

Its true mean is  $z = \frac{1}{2}$ . That is, on the average for a large number of particles, each observed for the same length



THE SIMPLE RANDOM WALK.

of time  $n$ , the proportion of time spent by them above or below the line is  $\frac{1}{2}$  as we would "expect." But a large proportion of these particles will spend *nearly all* their time above the line, or *nearly all* their time below the line. I was delighted with this distribution. It was positively refreshing after using so many distributions with a large hump in the middle to meet one with a deep depression there instead and in addition, one that has interesting practical applications in many diverse fields. So there I sat, fascinated by these remarkable results and admiring the neat and streamlined manner in which Feller had woven together theorems from Bertrand in 1873, Levy in 1939 and on to Sparre Andersen in 1954, when suddenly the lightning struck. I realised that I had collected data that contained these startling results twenty years ago and had never so much as glimpsed them.

It made me as mad as a wet hen to think of it. However, this experience is a very common one. Far better men than any of us have suffered in precisely the same way. A very famous example concerns the early nineteenth century analysts Euler, Lagrange and others who studied elliptic functions for years and found the going very heavy indeed. At last, as told by Bell in "The Development of Mathematics," the mathematician Abel revolutionised this subject and at the same time opened the flood-gates of nineteenth century analysis by the simple remark made in 1827: "I propose to study the inverse function."

To illustrate his meaning in a non-technical manner let us cast our minds back to the days before the invention of scotch tape and imagine that we have bought a ball of string. If we are now foolish enough to do the obvious thing and unwind the ball starting with the end of the string that appears on the outside, all goes well for some time and then the ball suddenly collapses into an almost inextricable tangle. This is analagous to what happened to the earlier mathematicians. If on the other hand we note that the ball of string is hollow and poke about inside the ball until we find the other end of the string, and pull lustily on that, lo and behold the whole ball unravels smoothly, in much the same way as Abel's method of attack simplified the study of elliptic functions.

Talking of simple remarks, there was the case which occurred at a recent meeting of our Society when a friend of mine, Mr. J. S. Maritz, was holding forth on some work he had been doing, with a certain amount of collaboration from myself. It concerned a study of the extreme values of body temperatures at which native mine labourers could work in safety. Suddenly a voice from the audience asked "Why didn't you use extreme value theory?" The lecturer and I looked at each other across the room. Why hadn't we used extreme value theory! Of course, our interrupter, Mr. P. Winer, paid for his temerity. The very next day he was put on to the job of applying extreme value theory to the problem in hand, which he did with very satisfactory results.

Yet another instance of local interest concerns our late professor of physics, Professor G. T. R. Evans, who used to tell his students about an experiment where he was trying to pass an electric current through a chemical solution. The current would pass in the one direction, but not in the other. He noticed that one of the electrodes was dirty and polished it and then the current passed happily in either direction. Years later he read of an important new discovery: an oxide that permitted a current to pass in one direction but resisted its passage in the other direction and he had scraped away his specimen of that oxide! Doubtless you can think of other examples. So awful warnings lie all around us. Benefit from them, *if you can*.

I have mentioned various text books, and talking of such books some of them are extraordinarily satisfying; lucid, rigorous, artistic. Here is a monument to man's intellectual abilities; to his capacity for clear logical thought. But such a book is often the distilled essence

of previous workers' efforts. When one examines these previous efforts in some detail a curiously confused picture usually emerges. Why did this writer use such a clumsy notation? How was it that that writer did not push the theory further? What on earth was the third man doing; his basic ideas were quite fallacious! And so on. Throughout scientific history one gets the impression of progress by trial and error—and there have been plenty of errors. How much research has been up blind alleys? Is scientific progress a kind of random walk?

In conclusion: There may be some among you who have enjoyed these random remarks and agree with them. That will be very gratifying. But as I always say to my students, you don't have to believe what teacher tells you here. If any among you have been so exasperated by anything I have said that you will be goaded into doing some work to prove me wrong, that will be just wonderful!

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#### THE PRESIDENT'S COLUMN—CONTINUED FROM PAGE 1

neering applications of statistics, the design of experiments, operations research, and other techniques have been given widespread application in the Department of Defense, Department of Agriculture, Public Health Service, and other agencies.

The Federal data collection system is constantly evolving and improving its techniques and providing new information for the study of administrative and research problems. Characteristic of recent developments are the establishment of research units in many of the principal statistical agencies which now have Offices of Statistical Standards. Also, the new Center for Health Statistics in the Public Health Service was recently announced and pertinent activities in the Department of Agriculture have recently been regrouped into the Economic Research Service and the Statistical Reporting Service. The Bureau of Labor Statistics is involved in a five-year program on the revision of the Consumer Price Index and the Joint Economic Committee has just finished open hearings on the Stigler report on Government Price Statistics. A new publication on business cycle measurement is expected after July and further development is under way on such basic topics as the measurement of economic growth, characteristics of the unemployed, and buying plans of consumers. This list is not exhaustive, merely indicative; the Federal activities section of *THE AMERICAN STATISTICIAN* provides a useful running commentary on such developments.

There is a constant stream of new ideas injected into the system. The focus is, of course, the thinking of the producing agencies themselves in cooperation with the Central Office of Statistical Standards in the Bureau of the Budget. The Council of Economic Advisers plays an increasingly important role in making known the needs

for economic statistics. The Economic Statistics Subcommittee of the Joint Economic Committee and the Census and Government Statistics Subcommittee of the House Post Office and Civil Service Committee specialize in Federal data problems. An important statement from a non-Government group is the recent report of the Federal Statistics Users' Conference, "A Long Range Program for the Improvement of Federal Statistics," summarized in the February issue of *THE AMERICAN STATISTICIAN*.

There are many counterpart organizations in the States and in many of our large cities which also contribute to our store of data. There are also important contributions made by various non-governmental bodies. Generally speaking, all these additional sources are coordinated with the Federal activity.

An outstanding feature of the American system of intelligence is the way all these statistical activities are intermeshed and brought to bear on common needs. The Government agencies, through advisory committees, consultants, and discussions at meetings, including those of the Association and other professional societies, are constantly striving to find out what information is needed, how it can be used, and how the results can be improved. The universities and the private research organizations using these data are also deeply involved in their conceptual development and in improving their content. Business analysts and marketing groups, too, are constantly evaluating and using this output. For all these groups the American Statistical Association is proud to provide a common meeting ground, a forum for the discussion of differences of point of view, and a channel for the interchange of ideas and experience.

## Letter to the Editor

Dear Sir:

When I began the study of statistics at Purdue University just fifteen years ago (instructor: Irving W. Burr; Text: Kenney, *Mathematics of Statistics*, Parts I and II, First Edition), I was taught that a variate is a single observed value of a variable and that the term "distribution function" should be used only in the non-cumulative sense (if one meant "cumulative distribution function", one says so). What a pity that the current generation of statisticians has not had similar upbringing!

The concept of a variate as a single observed value of a variable is a very useful one. On the other hand, if the word "variate" is to be taken as synonymous with the word "variable", it is utterly useless (if one means "variable", why not say so?); yet this is precisely what is done in most modern statistics textbooks. Kenney has retained his earlier definition in the Second Edition of Part I, but Kenney and Keeping, in the Second Edition of Part II, give the other definition, as do most other authors.

With regard to the term "distribution function", I suppose that the best argument that can be given by those who define it in the cumulative sense is that they have a right to define a technical term in any way that they choose. Admittedly, if one coins a new word, he does have the right to define it in any way that he chooses, but it is doubtful that one has the right to give an old word a definition inconsistent with its commonly accepted non-technical meaning, and it is certain that no one has the right to require others to conform with such a definition. I mention these points because the "cumulative distribution function", called by many simply the "distribution function", does not tell, except in a very roundabout way how the variable is distributed (not the variate, I submit, since a variate, being a single observed value, has no distribution). If I have \$10 to divide among A, B, and C, I certainly will not tell how it is distributed by saying that I give A \$2, A and B together \$5, and A, B, and C together \$10, but rather that I give A \$2, B \$3, and C \$5. Nevertheless the probability density function  $f(x)$ , which is called a "distribution function" in Kenney, Part II, First Edition, is called instead a "frequency function" in Kenney and Keeping, Part II, Second Edition, where the term "distribution

function" is applied to  $F(x) = \int_{-\infty}^x f(x) dx$ , as it is in most other modern textbooks.

Perhaps the use of "variate" as synonymous with "variable" and "distribution function" in the cumulative sense have become too firmly entrenched in the statistical literature ever to be dislodged. Nevertheless I, for one, feel an inner compulsion to raise my voice and my pen in protest.

Sincerely yours,

H. Leon Harter

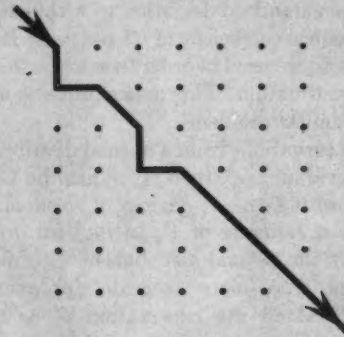
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# THE REQUIRED SAMPLE SIZE WHEN ESTIMATING VARIANCES

W. A. THOMPSON, Jr. and JACK ENDRISS\*, *University of Delaware*

In planning a sampling investigation it is desired to know a certain standard deviation to within 10 per cent with a confidence coefficient of 95 per cent. How many observations do we need in order to achieve the required accuracy of estimation? This paper provides an answer to this and similar problems.

Given  $n$  observations from a normal distribution with mean  $\mu$  and variance  $\sigma^2$ , then  $fs^2/\sigma^2$  has the Chi-square distribution with  $f=n-1$ , degrees of freedom.  $s^2$  is the usual unbiased estimate of  $\sigma^2$ . In its turn, for large  $f$ ,  $\sqrt{2\chi^2}$  follows the normal distribution with mean  $\sqrt{2f}$  and variance 1. A more accurate approximation is obtained by taking the expectation of  $\sqrt{2\chi^2}$  to be  $\sqrt{2f-1}$ , as in Fisher and Yates Tables, for example. However, the use of  $\sqrt{2f}$  seems to lead to a satisfactory degree of closeness for small  $f$  and is simpler to use.

Hence,

$$(1) \quad P(|\sqrt{2fs^2/\sigma^2} - \sqrt{2f}| < y_{1-\alpha/2}) = 1 - \alpha$$

is approximately true for large  $f$ .  $y_{1-\alpha/2}$  is the value of a  $N(0, 1)$  deviate below which  $1-\alpha/2$  of the area under

the curve lies. The equation (1) may be rewritten as

$$(2) \quad P\left(\left|\frac{s-\sigma}{\sigma}\right| < \frac{y_{1-\alpha/2}}{\sqrt{2f}}\right) \approx 1 - \alpha$$

so that if the relative error is to be less than  $d$  then  $d = y_{1-\alpha/2}/\sqrt{2f}$ , and

$$(3) \quad f = \frac{1}{2} \left( \frac{y_{1-\alpha/2}}{d} \right)^2.$$

As an example of the use of equations (2) and (3) suppose that it is desired to know a certain standard deviation to within 10 per cent with a confidence coefficient of 95 percent.  $d=0.1$  and  $y_{1-\alpha/2}=1.96$ .

According to (3),  $n=0.5(1.96/.1)^2+1 \approx 193$  and we will need to take 193 (or about 200) observations to achieve the required accuracy of estimation.

It is not difficult to solve the problem of the preceding paragraph exactly. A confidence interval for the relative error may be computed as follows

$$P(\chi_{\alpha/2}^2 < fs^2/\sigma^2 < \chi_{1-\alpha/2}^2) = 1 - \alpha,$$

$$P(f^{-1}\chi_{\alpha/2} - 1 < (s-\sigma)/\sigma < f^{-1}\chi_{1-\alpha/2} - 1) = 1 - \alpha.$$

To be analogous with the normal approximation let the length of this confidence interval be  $2d$ . The results of

\* We would like to thank R. F. Jackson, Mrs. Marjorie Lieske and the referees for their help and suggestions in preparing this little paper.

TABLE I—Half length of confidence interval  
as a function of  $\alpha$  and  $f$

$f \quad \alpha$	.01	.02	.05	.10	.20	.50
1	1.40	1.28	1.10	.949	.760	.416
2	1.12	1.02	.881	.752	.596	.321
3	.957	.874	.748	.636	.501	.267
4	.850	.775	.661	.559	.439	.234
5	.772	.702	.597	.505	.396	.210
6	.711	.646	.549	.463	.363	.192
7	.663	.602	.511	.431	.337	.178
8	.623	.566	.479	.404	.316	.167
9	.590	.535	.453	.382	.298	.158
10	.561	.509	.431	.363	.283	.150
11	.537	.486	.411	.346	.271	.143
12	.515	.466	.394	.332	.259	.137
13	.495	.449	.379	.319	.249	.132
14	.478	.433	.366	.308	.240	.127
15	.462	.419	.354	.298	.232	.123
16	.448	.406	.343	.288	.225	.119
17	.435	.394	.333	.280	.218	.115
18	.423	.383	.324	.272	.212	.112
19	.412	.373	.315	.265	.207	.109
20	.402	.364	.307	.258	.202	.106
21	.393	.355	.300	.252	.197	.104
22	.384	.347	.293	.246	.192	.101
23	.376	.340	.287	.241	.188	.099
24	.368	.333	.281	.236	.184	.097
25	.361	.326	.275	.231	.180	.095
26	.354	.320	.270	.227	.177	.093
27	.347	.314	.265	.223	.174	.092
28	.341	.309	.260	.219	.171	.090
29	.335	.303	.256	.215	.168	.088
30	.330	.298	.252	.211	.165	.087

TABLE II—Tabulation of  $f_a$ 

$f$	$\alpha$	.01	.02	.05	.1	.2	.5
1		1.7	1.7	1.6	1.5	1.4	1.3
2		2.6	2.6	2.5	2.4	2.3	2.2
3		3.6	3.5	3.4	3.3	3.3	3.2
4		4.6	4.5	4.4	4.3	4.3	4.2
5		5.6	5.5	5.4	5.3	5.2	5.2
6		6.6	6.5	6.4	6.3	6.2	6.2
7		7.5	7.5	7.4	7.3	7.2	7.2
8		8.5	8.4	8.4	8.3	8.2	8.2
9		9.5	9.5	9.4	9.3	9.3	9.1
10		10.5	10.4	10.3	10.3	10.3	10.1
11		11.5	11.5	11.4	11.3	11.2	11.1
12		12.5	12.5	12.4	12.3	12.3	12.1
13		13.5	13.4	13.4	13.3	13.3	13.1
14		14.5	14.4	14.3	14.3	14.3	14.1
15		15.5	15.4	15.3	15.2	15.3	15.0
16		16.5	16.4	16.3	16.3	16.2	16.1
17		17.5	17.4	17.3	17.3	17.3	17.2
18		18.5	18.4	18.3	18.3	18.3	18.1
19		19.5	19.4	19.4	19.3	19.2	19.1
20		20.5	20.4	20.4	20.3	20.1	20.2
21		21.5	21.5	21.3	21.3	21.2	21.0
22		22.5	22.5	22.4	22.4	22.3	22.3
23		23.5	23.4	23.3	23.3	23.3	23.2
24		24.5	24.4	24.3	24.3	24.3	24.2
25		25.5	25.5	25.4	25.4	25.4	25.2
26		26.5	26.4	26.3	26.3	26.2	26.3
27		27.6	27.4	27.4	27.2	27.1	26.9
28		28.5	28.3	28.4	28.2	28.1	28.1
29		29.6	29.5	29.3	29.3	29.1	29.4
30		30.5	30.5	30.2	30.4	30.2	30.1

calculating  $d = (\chi_{1-\alpha/2} - \chi_{\alpha/2}) / 2f^{\frac{1}{2}}$  for various  $\alpha$  and  $f$  values is shown in Table I. The necessary sample size may be determined from the value of  $f$  in Table I which corresponds to the desired  $\alpha$  and  $d$  entries. In order to accommodate values of  $d$  smaller than those listed in Table I, we may consider that the table should be extended to larger degrees of freedom. However, a table must end somewhere and it is shown in the next paragraph that the approximation (3) is sufficiently accurate to make such an extension unnecessary.

Since (3) is an asymptotic result, a legitimate question is, "To what extent does the formula deteriorate for small  $f$ ?" To answer this question, the  $d$  values of Table I may be substituted in (3) to yield a new  $f$ ,  $f_a$ , say. The agreement between  $f$  and  $f_a$  indicates the accuracy of the approximation of equation (3). The results of such a numerical investigation are shown in Table II. Provided that the objective is including the relative error in a confidence interval of length,  $2d$  the approximation is so good for small samples that the asymptotic nature of (3) need not be considered for most purposes.

Considerations of compactness and universal applicability lead the authors to prefer the use of formula

(3) to Table I. However, Table I is available should the reader not share this opinion.

The results of the previous paragraphs, and in particular equations (2) and (3), can be extended to the general least squares model. For this more general case,  $f$  would be the number of degrees of freedom due to error. As an example, with  $f$  redefined, equations (2) and (3) would apply in all "fixed effect" analysis of variance situations.

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# QUESTIONS & ANSWERS

Devoted to discussions of conceptual and measurement problems . . . . by ERNEST RUBIN, U. S. Department of Commerce and American University, Washington, D C.

## Some Remarks on Soviet Agricultural Statistics \*

Discussion by Luba Richter

According to a page 1 report in the New York Times of January 12, 1961, Premier Khrushchev excoriated "figure-jugglers" and demanded "the expulsion of persons trying to 'hoodwink' the state on production figures." From a methodological viewpoint Khrushchev's remarks are of considerable interest. In the U.S.S.R. and other countries of the Soviet bloc, official guide books have been published with titles such as "The Use of Statistics as Political Propaganda." Books of this type, however, are not to be compared with Darrell Huff's little primer, *How to Lie with Statistics*.

The status and development of statistics and statisticians in the U.S.S.R. during almost four and a half decades of Soviet history is a complex matter, containing many paradoxical elements. It is difficult to grasp the logic of a system that regards economic planning as a *sine qua non* but does not require the highest possible standards for the statistics that serve as the structure of the planning.

I wish to thank Mrs. Luba Richter of Washington, D. C. for her very interesting commentary on the agricultural statistics of the Soviet Union.

\* \* \* \* \*

In the Soviet Union statistics are an important tool not only of economists, but also of propagandists and party leaders in general. The propaganda use and value of statistics is sufficiently well known. Less known is the influence of internal political developments upon statistics and of the use of statistics as a political tool. The recent exposure of statistical falsifications apparently also fall into this category.

A few examples from the recent past will illustrate the point. Absolute data on output of meat and milk had not been available for many years. When published, in 1957, the information was given in a speech by Khrushchev, in which he announced the intention to outstrip the U.S. in the per capita output of meat and milk. It was *after* that speech that the Central Statistical Office began to include meat and milk data in its reports and publications.

The interrelationship between internal politics and statistics is pronounced with respect to grain, regarded by the Soviet authorities as the key agricultural product. Five years elapsed between the official condemnation in 1953 of estimating grain production on the basis of the "bio-

logical" yield, and the publication of the revised tonnage figure. Again, it was Khrushchev who revealed the figure; again it was in a speech with strong political overtones, at the time that he denounced his political adversary, Malenkov. (The release of the grain figure came only a few months after an exchange group of U.S. agricultural economists had been denied this information by high ranking Soviet officials as constituting "classified information.")

The regular reports issued by the Central Statistical Office on the state of the economy also reflect the exigencies of the day. While adhering to an overall pattern, certain data customarily incorporated in the report are either omitted or presented in a veiled form when they are regarded unsuitable for public consumption. For example, the 1960 report failed to include data on the income of collectives; it also suppressed or omitted other more direct information, which would have shed additional light on the recent conversions of some collective farms into state farms.

For many years, the scarcity of statistics had been a serious handicap to research in the Soviet Union and was publicly deplored by the dean of Soviet economists, S. G. Strumilin, in 1957.<sup>1</sup>

The publication of statistical material has increased greatly during the past few years. The convenience of having statistical series for major indices for the first time after many years is obvious. Yet, statistical data do not become reliable simply because they are incorporated in a table and presented between two hard covers. This does not mean that all statistics are unreliable. Far from it. However, despite a certain improvement<sup>2</sup> during the past years, statistical series and the manner in which they are used frequently remain misleading. By far the most complete critical review of Soviet statistics is contained in N. Jasny's *Commentary*.<sup>3</sup> Although writ-

<sup>1</sup> *Vsesoyuznoye Soversheniye Statistiki*, (Stenograficheskii Otchet), Moscow, 1959. More recently the same point was made by other economists; see *Voprosy Ekonomiki*, No. 3, 1961, p. 157.

<sup>2</sup> For example, the use of indices related to an undefined base has declined noticeably in recent publications, but has not been eliminated. Thus the only information so far released on real income of peasants is still expressed in percent of 1913. In this connection, Strumilin's comments made in another context appear pertinent: "The (material) well-being which we used to show (in our statistics) did not appear very persuasive because interest rate figured on unknown 'capital' is unintelligible." op. cit. page 96. The only table on farm prices in the *Agricultural Handbook* (Sel'skoye Khozyaistvo SSSR, Moscow, 1960), page 117, covers the period of 1953 through 1959 only and is given in percent of 1952.

<sup>3</sup> Naum Jasny, *The Soviet 1956 Statistical Handbook: A Commentary*, The Michigan State University Press, 1957.

\* For related discussions on Soviet statistics in this section see: "Some Problems in Soviet Statistics" by Naum Jasny, April 1955; "Death Rates and Living Standards in the U.S.S.R." by Naum Jasny, October 1957; and "Aspects of Soviet Census and Population" by Selegen, Petrov and Brackett, February 1959.

ten in 1956, i.e., before a great deal of additional material had been released, it retains its validity and is an indispensable guide to an intricate area of Soviet data.

There are four major shortcomings:

1. Lack of definition of the concept used, particularly changes in the concept over time, and absence of an explanation of the methodology used in statistical calculations.
2. Use of unrepresentative data or periods;
3. Omission and suppression of important data; this is true of specific indices as well as of certain years; (for example, meaningful data are not available on net income of collectives, on earnings of kolkhoz members, and on prices.)
4. Falsifications and/or "padding" of accounts on all levels, from the farm up; the latter phenomenon is currently receiving considerable publicity, following Khrushchev's disclosures at the January plenum of the Communist Party. It is, however, by no means new.<sup>4</sup>

Soviet officials, economists and statisticians have in recent years been quite frank in noting deficiencies in Soviet statistics at professional meetings. The cited conference at which Strumilin spoke is a case in point. At another meeting held in 1957 a prewar survey was criticized as follows: "In this respect the Central Statistical Office has put economists in a rather difficult position, having conducted a survey of labor productivity in collectives not for an average of a number of years, and not for typical years, but on the basis of the highest yielding years of 1935 and 1937 and for leading farms and publishing these data as typical."<sup>5</sup> At a more recent session called by the Central Statistical Office to discuss the various Statistical Handbooks issued since 1956,<sup>6</sup> a number of participants spoke of the desirability of better and more comprehensive statistical coverage; there was also criticism of the use of "noncomparable data." At least two participants referred to the need for definition of a methodological character, one of them demanding that "all changes in methodology must be specified."

There are also purely technical difficulties. Collecting and collating statistics present formidable problems in a country where mechanical facilities other than the abacus are very limited, and where local officials frequently lack the necessary training. Furthermore, the required statistical reporting regarding collectives and state farms

is voluminous and none too simple. Comparable reporting for the private sector is not demanded. The output of the latter is ascertained on the basis of periodic surveys, budget studies and on estimates. There are about 25 million households (of collective farmers and of state farm workers, in addition to a large but unknown number of workers and employees in rural areas) engaged in small-scale agricultural operations. Their aggregate production constitutes a substantial share of total output of animal products, potatoes, vegetables and fruit; it is insignificant in other branches of agriculture. Data on the output of the private sector indicate higher productivity than seems plausible. Current milk yields in the private sector, for example show a significant improvement as compared with prewar as well as the pre-collectivization periods. The probability of a sizeable margin of error in this sector is large.

No attempt will be made in this brief review to discuss the more complex computations of agricultural aggregates, but the following examples pertaining to three major commodities will illustrate some of the difficulties encountered.

The concept of the "biological" crop, i.e., the expected yield determined approximately one week prior to the harvest, is probably the most widely known Soviet statistical practice deviating significantly from practices in the West. This procedure, introduced in 1933 for grain was expanded to include other crops in 1939. It remained in force until Stalin's death in 1953.<sup>7</sup>

In contrast to other changes in statistical concepts which were either never announced, or were not made known for a number of years, the change to the biological method was spelled out in the government daily paper the same year the change-over was effected. Official publications and statements of Soviet economists throughout the whole period used the biological crop data without any deflators; the inflated figures were also used in the calculation of gross agricultural production as well as national income.

In the fall of 1953 the decision to abandon this practice was announced.<sup>8</sup> It was not until 1958 that the first indication of the size of the downward revision became known. Present official data imply an average reduction of 23 percent for 1933-37,<sup>9</sup> fully 33 percent for the three years ending 1952, and over 40 percent for 1949. A downward revision of 33 and 40 percent can scarcely be attributed to harvesting losses alone. In part, it probably

<sup>4</sup> In 1947 B. Savel'ev, Chief of a Special State Inspectorate for Estimating Yields spoke of the need of combatting "cases of eyewash" and referred to the padding of data "for the purpose of creating a semblance of plan fulfillment". (*Planovoye Khozyaistvo*, No. 2, 1947, page 37). A Moscow Literary Gazette article by Ye. Lopatina was entitled "Interview with Eyewashers". In conclusion the writer said that one must not forget that the real successes achieved in the agricultural sector sometimes also include such "soap bubbles" as were mentioned in her article. (*Literaturnaya Gazeta*, August 6, 1960). See also N. Antonov's article in the same paper of November 17, 1959 and *Komsomolskaya Pravda* of August 14, 1960.

<sup>5</sup> E. S. Karnaukhova in *Proizvoditel 'nost' Truda v Sotsialisticheskoy Sel'skom Khozyaistve, Voprosy Metodologii i Metodiki*, Moscow, 1959, page 18.

<sup>6</sup> *Vestnik Statistiki*, No. 1, 1961, pages 81-86.

<sup>7</sup> For details see Naum Jasny, the *Socialized Agriculture of the USSR*, (Stanford, 1949); L. Volin, *A Survey of Soviet Russian Agriculture*, (Agriculture Monograph No. 5, Washington, D.C., 1951); *U. N. Economic Bulletin for Europe*, Second Quarter, 1951, Vol. 3, No. 2 Appendix B.

<sup>8</sup> G. Malenkov, then the Premier of the USSR, was the first to criticize the "incorrect practice of evaluating the results of the work of collectives not on the basis of the amounts actually harvested but merely on the basis of apparent yields." (Speech published in the central press on August 9, 1953). Nevertheless, in 1958 Khrushchev attacked him for the use, in 1952, of biological crop data.

<sup>9</sup> Jasny's estimates of the prewar barn crop, though the lowest among Western students, proved to be almost identical with those subsequently published in the Soviet Union.

reflects the over-reporting during 1947-53 when a Special Committee for Crop Estimating was in existence. It probably also reflects a—politically welcome—underestimate of the years immediately preceding the post-Stalin agricultural reforms.

The method used to ascertain these reductions for recalculating the “biological” crop to a “barn” basis has not been described. The two most likely approaches are the use of kolkhoz records and/or of grain balance sheets. Neither can ensure strict comparability with the barn crop in terms of “bunker” weight described below, since both methods yield a grain crop exclusive of “unutilizable” waste.

Soviet statistical textbooks state that (beginning with 1954) the grain crop is determined in terms of “bunker weight,” i.e., as it comes from the combine. “All threshed grain is counted, prior to additional (subsequent) cleaning and sorting;” foreign matter and dockage (“*otkhod*”) are included in the “bunker weight.”<sup>10</sup> This means that moist and wet grain is weighed in, that unripe, broken and otherwise unacceptable kernels are included, as are seeds of weeds and other impurities. By definition, all post-harvesting losses incurred in loading, unloading, in transport and in storage are also included.

The large expansion of grain acreage in regions where harvesting normally is accompanied by rainy weather, where early frosts are frequent, and which have a high incidence of weed infestation, must have raised the percentage of “unutilizable” waste. Post harvesting losses have also risen significantly because transportation, storage and drying facilities in these areas lag far behind increased requirements, with much grain “stored” in the open for long periods.

Whether an April 23, 1958 unpublished instruction of the Central Statistical Administration<sup>11</sup> has introduced an additional element of incomparability, it is impossible to say. In any case, it is since that year that the grain estimates have begun to appear unrealistically high.

A vast expansion after 1955 of corn acreage harvested in the milk-wax stage is another, though minor factor making current grain crop estimates not strictly comparable with earlier years. As is the case in the U.S., such corn (used for ensilaging) is counted as grain, converted to a dry grain equivalent. Once the corn is ensilaged, it is impossible to check on the correctness of the dry grain equivalent used to compute the yield. Thus even if the official conversion coefficients were realistic, local officials eager to “prove” the success of Khrushchev’s “queen

of the crops” may well err on the high side.<sup>12</sup>

The discrepancy between what appears to be a reasonable estimate of actually useable grain and official data is too large to be accounted for by the use of “bunker weight,” the overestimate of corn, and the inclusion of postharvesting losses. An unannounced recent change in crop estimating instructions and/or some plain “padding” of accounts such as has recently been exposed by Khrushchev must be assumed.

When the current meat output was announced for the first time since the war, it was so far out of line with prewar meat output series (for comparable borders) that a change in the concept seemed one of the likely explanations. This proved to be the case.<sup>13</sup> The present concept of “meat” includes meat of major livestock categories, as well as poultry, rabbits, horse and deer meat. Before the war, most statistics encompassed only the major meat categories (beef and veal, pork, lamb and goat). In contrast to the U.S., slaughter fats have always been included in the “meat” concept.

Also included in the present “meat” concept are four categories of “sub-products,” (“*gol’e*”) a term which can best be translated as edible and inedible offals. Before the war “*gol’e*” was not included. The share of “*gol’e*” in the carcass weight, as given in postwar publications, ranges from 20-24 percent for beef, 20-21 for mutton, 14-17 percent for pork.<sup>14</sup> U. S. Department of Agriculture data for the U.S. is much lower—6.7 percent for beef, 10.7 percent for veal, 5.1 percent for lamb and mutton, and 6.7 percent for pork.<sup>15</sup> The difference is too large to be accounted for by the heavier weight of animals in the U.S. It should be noted that the industrial meat output series (i.e., output of state slaughter houses) includes “subproducts” of the first category only. This category probably corresponds rather closely to the U.S. definition of variety meats.

A comparison of the new and old series on major meats seems to indicate that the new figures for prewar were arrived at by applying a fixed coefficient to the old

<sup>12</sup> Occasionally one comes across statements in technical Soviet publications indicating that estimates of corn yields leave much to be desired. Also, there is a discrepancy of almost 40 percent in data on the 1959 Kazakhstan corn as published in the *Agricultural Statistical Yearbook* and the editorial of the official Kazakhstan journal *Sel'skoye Khozyaistvo Kazakhstana*, No. 6, 1960. A similar discrepancy is pointed out for Gorky oblast in *Sel'skaya Zhizn*, July 28, 1960, p. 4.

<sup>13</sup> *Zhivotnovodstvo SSSR*, Moscow, 1959, particularly pages 157ff. A detailed review of the available evidence was made prior to that by Nancy Nimitz, *Soviet Statistics of Meat and Milk Output: A Note on Their Comparability Over Time*, RM-2326, February 6, 1959, The Rand Corporation.

<sup>14</sup> A. M. Brianskii, *Statistika Zhivotnovodstva*, Moscow, 1956, p. 147 for the lower figures and V. S. Smirnov, Editor, *Tovaro-vedenie Prodovol'stvennykh Tovarov*, (Moscow, 1954), p. 624 for the higher figure.

<sup>15</sup> U. S. Department of Agriculture, LMS-109, May, 1960, p. 21. In this connection a statement by H. R. Davidson, president of the American Meat Institute, is pertinent. According to the Washington Post he said that tests made by the Institute revealed 24.5 percent of the weight of the average beef carcass to be “nonsalable fat, suet, trim and bones.” (March 10, 1960, p. A25.)

<sup>10</sup> A. I. Gozulov, *Istoriya Otechestvennoy Statistiki*, (Moscow, 1957), pp. 78-79. A. I. Gozulov, *Statistika Sel'skogo Khozyaistva*, (Moscow, 1959), p. 451. Also among others, F. A. Zubarev in *Uchet i Finansy v Sovkhozakh i Kolkhozakh*, No. 8, 1960. According to the latter, state farms determine the crop in terms of “bunker weight” and also after subsequent cleaning and drying, but in collectives only the “bunker weight” is established.

<sup>11</sup> The instruction was mentioned in a *Handbook for Economists* (*Spravochnik Ekonomista*) by G. Z. Kuperadze, Tbilisi, 1960, p. 164, but no elaboration of it was given. The reference was singularly laconic, in sharp contrast to the treatment of other, minor points in the same chapter.

figures for each of the major meat categories, (84, 88 and 83 percent for beef, pork and lamb respectively).

With reference to the Soviet concept of "milk" considerable misunderstanding exists. For quite a while after the war it was not clear whether the term was being applied to cow's milk or whether it included milk from all animals. The publication of data on both series in one book (*Zhivotnovodstvo, SSSR, 1959*) has now clarified this point, although there is still a question why for a few years (1932, 1933 and 1937) the two sets of figures are identical.

Confusion continues to exist with respect to what is "milk produced." Most U.S. students tend to believe that, in contrast to the Western practice, milk sucked by calves is included in the Soviet count.<sup>16</sup> This, however, is definitely not the case, at least as far as the regulations are concerned. The latter are quite explicit on that score.<sup>17</sup> The misunderstanding probably occurred because Brianskii stated that such milk is not counted in economic statistics but that for the purpose of evaluating the "zootechnical" quality of an animal, all milk, including that sucked by the calf "must be counted."

The probability that there is now a greater degree of noncompliance with the above regulation may partly explain the seeming exaggeration of milk statistics. An overestimate in the private sector—which still accounts for roughly half of the total—is another factor.

<sup>16</sup> Nancy Nimitz, op.cit. p. 23ff. D. Gale Johnson and Arcadius Kahan in *Comparison of the U. S. and Soviet Economies*, (Joint Economic Committee, Congress of the United States, Washington, D.C., 1959), Part I, pages 202 and 223.

<sup>17</sup> A. M. Brianskii, op.cit. p. 122 and *Narodnoye Khozyaistvo SSSR v 1959 Godu*, p. 839. It was angrily reiterated by V. Starovskii in *Vestnik Statistiki*, No. 4, 1961, page 105.

## LETTER TO THE EDITOR

Dear Sir:

In the February 1961 issue of *The American Statistician* Arthur G. Auble expressed the belief that the Bureau of the Census did not use the most adequate method to interpolate the number of households in years other than those ending in 0 or 5. The procedure used by the Bureau had been to project the total number of households for July 1, 1960, 1965, and 1970 and then to obtain estimates for intervening years "through an interpolation process in which preliminary figures were based on the assumption that the year-to-year growth in number of households would follow the same pattern as the growth in the number of men who are in the principal ages of first marriage (age 20 to 24); the final figures . . . resulted from the application of a three-year moving average to these preliminary figures." Mr. Auble stated that a more satisfactory method of interpolation would be to estimate the annual growth in households through its correlation with the number of men aged 20 to 24 rather than with the increase of men in this age group. The undersigned persons concur with this judgment. The point raised here had already been brought to the atten-

tion of the Bureau in January 1961, by another user of the household projections. The Bureau thereupon prepared revised series of estimates for intervening years and made them available to several interested persons.

The accompanying table presents revised figures which are based on the assumption that the increase in the number of households since the base year is proportional to the average number of years lived by men 20 to 24 years old between the base date and middle of the year in question. The Bureau of the Census plans to issue a new report on household projections containing figures similar to those in the accompanying table. They would be different, however, in that they would be consistent with the new household definition adopted for the 1960 Census and would include Alaska and Hawaii.

Sincerely yours,

Paul A. Glick  
Chief, Social Statistics Branch  
Population Division  
Bureau of the Census

David M. Heer  
Family Analyst  
Population Division  
Bureau of the Census

## PROJECTIONS OF THE NUMBER OF HOUSEHOLDS, FOR CONTERMINOUS UNITED STATES: JULY 1960 to 1970 (REVISED)

(Old household definition. Numbers in thousands, excluding Alaska and Hawaii)

Year	Series A	Series B	Series C	Series D
1960	52,425	51,877	51,614	51,350
1961	53,370	52,656	52,300	51,947
1962	54,341	53,457	53,005	52,560
1963	55,356	54,294	53,742	53,201
1964	56,418	55,170	54,513	53,871
1965	57,517	56,076	55,311	54,565
1966	58,481	56,969	56,090	55,321
1967	59,505	57,917	56,917	56,124
1968	60,593	58,926	57,797	56,978
1969	61,736	59,985	58,721	57,875
1970	62,933	61,094	59,689	58,814

Source: Unpublished data, Department of Commerce, Bureau of the Census.

## Reaction to Paul Levy's topic during Third Berkeley Symposium, July 1955

A Gaussian Random Function of a Point of Hilbert Space  
Is first upon the program which the statisticians face  
On Thursday when they gather in this academic place  
Their knowledge to exchange, their colleagues to embrace.

Of what this title means my feeble mind holds but a trace;  
My admiration for it has no comprehending base  
But stems completely from its pure majestic grace,  
So heptametric in its length, iambic in its pace.

—Arnold Court  
Saxonville, Mass.

## CHAPTER NOTES

### Albany

The Chapter reports a successful year thus far. It started on a light note with a picnic on September 10th at Thatcher Park in the Helderbergs. On September 19th a luncheon business meeting was held, at which there was good attendance and active discussion. The first regular dinner meeting of the year was held on October 19th and dealt with an analysis of the claims of the Presidential nominees. Dr. Seymour Saks, a consultant to the New York State Department of Audit and Control, was the speaker.

The changing pattern of jobs, 1960-1970, was the subject of the November 23rd luncheon meeting. Dr. Charles A. Pearce, Director of the Division of Research and Statistics of the New York State Department of Labor, was the speaker.

An informal discussion session, led by Charles Armstrong of the New York State Education Department, was held the evening of December 7th. The subject of the discussion was "What Can We Prove by Statistics?"—an examination of the "null hypothesis" approach to experimental proof.

On January 12th a joint meeting was held with the American Society for Quality Control. An afternoon session at 4:30 was followed by a social period, dinner and an evening session. The speaker at the afternoon session was John Clark, Methods Engineer for the New York Telephone Company. Dr. Irving Burr, Professor of Mathematics and Statistics at Purdue, spoke on Probability Distributions in the evening.

A luncheon meeting was held on February 14th at which Dr. George Boguslavsky, Professor of Psychology at Rensselaer Polytechnic Institute spoke on "Statistical Measures in Psychology." A special evening meeting on March 1st was devoted to a discussion led by Dr. Alan M. Gittelson, Director of Health Statistics, New York State Department of Health, of some notions underlying stochastic processes.

The regular dinner meeting was held on March 16th. Murray Klingaman of the New York Telephone Company spoke on the effect on an organization of installing electronic computers. The meeting drew an especially large attendance.

The speaker at the April 12th dinner meeting was Norman Allaway, Associate Biostatistician, New York State Health Department. Mr. Allaway spoke on dietary data collection problems.

The Chapter conducted a preparatory course for candidates for the State Senior Statistics Clerk examination, for which 89 persons enrolled. The course consisted of ten two-hour evening sessions, from August 15 to September 30, 1960.

### Central Indiana

The April 6th meeting was held on the Indiana University campus in Bloomington. Professor James A. Norton, the Chapter President, gave his Presidential Address on the subject, "Factor Analysis—A Brief Exposition and an Application." The 1961-

62 officers were elected. They are:

President—ROBERT A. CALHOUN, State Board of Health, Indianapolis

1st Vice-President—GEORGE J. STOLNITZ, Department of Economics, Indiana University

2nd Vice-President—H. LATHAM BREUNIG, Eli Lilly & Co., Indianapolis  
Secretary-Treasurer—HELEN BOZIVICH, Statistical and Computing Laboratory, Purdue University

The speaker at the May 4th meeting, held at Purdue University, was Professor J. Stuart Hunter, Department of Statistics, University of Wisconsin. Professor Hunter's subject was "Response Surface Methodology Applied to Process Optimization." The meeting was preceded by a social period and dinner in the Union Cafeteria.

### Central Iowa

Mr. Miron F. Wilson, Director of the Quality Control Division of Collins Radio Company, Cedar Rapids, Iowa, spoke at the February 8th meeting. His subject was "Quality Control Techniques used in Short Run Production." One of the many components manufactured at Collins was traced through production via slides and discussion. Mr. Wilson's industrial experience provided emphasis on the applied rather than the theoretical use of statistical techniques.

Professor Milton Sobel, University of Minnesota, was the featured speaker of the March 22nd meeting held in the Memorial Union Building of Iowa State University. The subject of his talk was "Ranking of Normal Populations." His broad industrial and academic experience provided a tie between the purely theoretical and the applied.

### Central New Jersey

The speaker at the May 9th meeting, held at Princeton University, was Egon S. Pearson, Professor Emeritus, University College, University of London. Professor Pearson's subject was "Some Tests for Randomness of Points on a Line."

### Chicago

"Bayesian Statistics" was the subject of the April 4th luncheon meeting. Professor Fred Ekeblad, Chairman of the Department of Statistics, Northwestern University, defined Bayes' problem and pointed out the controversial part of Bayesian statistics.

A dinner meeting was held April 11th at which H. Raymond Swenson, Assistant Professor of Industrial Engineering, Illinois Institute of Technology, was the speaker. Professor Swenson's topic was "Statistical Tools for Trouble-Shooting: Case Histories." Professor Swenson drew from his consulting practice to describe four case histories which demonstrated when to apply statistical techniques to solve problems.

Professor V. Lewis Bassie, Director of the Bureau of Business and Economic Research, University of Illinois, spoke on "The Effect of Government Spending on Recessions" at the April 21st luncheon meeting. Professor Bassie predicted that the mid-1961 recovery from the present mild recession would not be followed by

the economic growth necessary to bring low unemployment levels. He noted that the effect of government action to bring the economy out of the 1958 recession was not great enough to produce lasting recovery, and thought the present efforts of this Administration were not adequate to solve our economic problems.

The topic for the May 16th luncheon meeting was "Market Research in Urban Renewal." William K. Wittausch, Assistant Vice-President and Economic Advisor of the First Federal Savings and Loan Association, spoke on the role of private industry in this field. Thomas W. Claridge, Urban Renewal Specialist of the Federal Housing Administration, discussed the Government's part.

### Dayton

Dr. William E. Dickison, an Operations Research Analyst in the Operations Analysis Office at Headquarters Air Materiel Command, Wright-Patterson Air Force Base, spoke to the Dayton Chapter on March 27, 1961. The subject of his discussion was "Index Numbers: Construction and Use in Business and Government." Dr. Dickison was formerly Professor of Economics in the Graduate School of Business of the Air Force Institute of Technology.

The meeting, which was preceded by a dinner, was held in Sherman Hall, on the University of Dayton campus.

Mr. Bill Whiston was the speaker for the meeting of the Dayton Chapter on April 25, 1961. He is an Applied Statistician with Procter & Gamble. His subject was "Estimating Consumer Demand." He described the utilization of a computer technique for this purpose. The meeting was held in the Conference Room of the National Cash Register Engineering and Research Building. A dinner preceded the meeting.

### Madison

The charter of the new Chapter was presented at the May 18th meeting by Donald C. Riley, Secretary-Treasurer and Executive Director of the American Statistical Association. Mr. Riley described the organization and current activities of the ASA. Professor George E. P. Box, University of Wisconsin, spoke on the design of experiments.

Officers of the Chapter are:

President—PROFESSOR CHESTER W. HARRIS, University of Wisconsin

Vice-President—PROFESSOR JOHN M. CULBERTSON, University of Wisconsin

Secretary-Treasurer—PHILIP J. KINSLER, Oscar Mayer & Company

### New York

The following meetings, sponsored by one or more divisions of the Chapter, were held during the spring of 1961:

March 13th—Business and Economics and Statistical Techniques Divisions. "The Accuracy of Business Indicators." Chairman: Roger Williams, Luria Brothers, Inc. Speaker: Louis Weiner, Federal Reserve Board, Washington, D. C. Discussant: William H. Shaw, Textile Fibers, du Pont Company, Wilmington, Delaware.

March 23rd—Physical and Engineering

Sciences Division. "Reliability." Chairman: Arthur H. Walner, Material Laboratory, N. Y. Naval Shipyard. Speakers: Bernard Gleimer, Reliability Coordinator, Bulova Research and Development Laboratory, "Recurrence Times in Reliability," and Gordon Slotsky, Reliability Engineer, Bulova Research and Development Laboratory, "Effect of Sequence in Reliability Testing."

April 4th—Statistical Techniques Division. "Sampling over Time." Chairman: Nathan Morrison, Teachers College, Columbia University. Speaker: Professor Nathan Goldfarb, Hofstra College. Discussants: Abraham J. Berman, Division of Research and Statistics, New York State Department of Labor, and A. J. Jaffe, Bureau of Applied Social Research, Columbia University.

April 19th—Biostatistics Division. "Some Methodological Aspects of Surveys Dealing with Mental Health." Chairman: Monroe Lerner, Health Information Foundation. Speakers: Thomas Langner, Yorkville Project, Cornell University, and Regina Loewenstein, Washington Heights Survey, Columbia University School of Public Health. Discussant: Bruce P. Dohrenwend, Community Psychiatry Research Unit, Columbia University School of Public Health.

April 27th—Business and Economics Division. "Guides for Business and Economic Statisticians." Speaker: J. F. Shanklin, Treasurer, Union Carbide Corporation, "Whatever Lola (Management?) Wants."

The Third Annual Forecasting Conference was held on May 5th at the Plaza Hotel. The Conference consisted of two morning and two afternoon sessions and a luncheon meeting. The morning session on Short Range Economic Forecasting was chaired by Grover Ensley, National Association of Mutual Savings Banks. Speakers were Frank Morris, Investment Bankers Association, and Robert Solomon, Federal Reserve Board. The chairman of the session on Sales Forecasting was Harrison W. Cole, Johns-Manville Corp.; the speakers were James Rich, U. S. Steel Co., and Ralph Burgess, Ralph Burgess and Associates. Professor James S. Duesenberry of the Harvard Department of Economics spoke at the luncheon meeting on "Reflections on Cycles and Economic Growth." William F. Butler, Chase Manhattan Bank, was chairman. Speakers at the afternoon session on Long Term Forecasting were William Freund, Prudential Insurance Company, and Leonard Wilson, E. I. du Pont de Nemours and Company; the chairman was Herbert Stein, Committee for Economic Development. The fourth session dealt with Stock Market Forecasting. The chairman of this session was A. Wilfred May, Commercial and Financial Chronicle; the speakers were Garfield A. Drew of Drew Investment Associates, Inc., and Edmund W. Tabell, Walston and Company, Inc.

The New York Area Chapter's Annual Meeting was held on May 17th. The meeting was preceded by a social hour and dinner. Awards were presented to the outstanding students of statistics from twelve colleges in the metropolitan area (see the item on the N. Y. Chapter Collegiate Award Program in the News Section of this issue).

The following new officers were elected for the year beginning July 1, 1961:

President—ABRAM J. JAFFE, Bureau of Applied Social Research, Columbia University.

Secretary—SIDNEY SAMETH, Union Health Center, International Ladies Garment Workers Union

Executive Council—CARL L. EHRHARDT, New York City, Department of Health  
ROBERT L. TEBEAU, Merrill, Lynch, Pierce, Fenner & Smith, Inc.

## North Carolina

"Some Rank Order Statistics in Life Testing" was the topic of an address delivered to the North Carolina Chapter in Chapel Hill on March 14, 1961. The speaker was Nathan Mantel, Head of the Experimental Statistics Section, Biometry Branch, National Cancer Institute. The paper dealt with problems met in the comparison of two sample "decumulative" distribution functions of the type encountered in life testing and mortality studies. Non-parametric methods of assessing differences were presented, and some indication of their power was given.

The meeting was preceded by a dinner held in the "Front Room" of Lenoir Hall on the campus of the University of North Carolina. After the meeting there was a social hour arranged by the Department of Biostatistics.

Officers of the Chapter elected for 1960-61 were:

President—HALE C. SWEENEY, Research Triangle Institute, Durham, North Carolina

Secretary-Treasurer—WILLIAM A. GLENN, Research Triangle Institute, Durham, North Carolina

## North Texas

Dr. Leroy Folks, who has been President of the North Texas Chapter, has left the area to join the faculty of Oklahoma State University. The Vice-President, W. W. Hoy, has assumed the duties of President.

## Pittsburgh

The speaker at the April 11th meeting was Dr. S. M. Free, Smith, Kline & French Laboratories. He described "Some Statistical Applications in the Pharmaceutical Industry" in which the design phase is emphasized, giving as an example a cross-over design in which only half of the patients crossed over.

Professor Frank J. Anscombe of Princeton University addressed the final meeting of the season, held May 9th, on "The Examination of Residuals." He showed how using the observations from an experiment, a regression of the residuals against the fitted values can furnish information about both the adequacy of the model and the degree of independence, homoscedasticity, and normality of the errors.

Officers of the Pittsburgh Chapter for 1961-62 are:

President—JOHN W. WILKINSON, Westinghouse Research Laboratories

Vice-President—EDWARD B. PERRIN, Graduate School of Public Health, University of Pittsburgh

Secretary—FREDERICK A. SORENSON, U. S. Steel Corporation, Applied Research Laboratory

Treasurer—THOMAS A. ELKINS, Gulf Research & Development Company

## Puerto Rico

During the past year, the following professional meetings were held: On May 26, 1960, Dr. Luis Escobar Cerda, Dean of the Faculty of Economic Sciences of the University of Chile, presented a paper on "La Necesidad de una Teoría sobre el Desarrollo como Base Fundamental para la Planificación Integral." This meeting was jointly sponsored by the Puerto Rican Planning Society.

On June 9, 1960, Lawrence H. Berlin, Executive Assistant to the Economic Development Administrator, presented a paper on "Puerto Rico as a Foreign Trade and Investment Center."

On July 28, 1960, at a testimonial dinner for the Hon. Candido Oliveras, Secretary of Education, Everett Riemer, Executive Secretary of the Human Resources Committee, presented a paper on "Implications of Economic Development for Education." On this occasion, the Association's medal to the UPR graduate with the most outstanding academic performance in the field of economics was presented to Ramon Enrique Bauza Higuera.

On November 16, 1960, Dr. Felipe Pazos, advisor to the Government Development Bank and former president of the National Bank of Cuba, presented a paper on "Economía de una Revolución: Cuba, 1959-60."

On December 5, 1960, at a meeting jointly sponsored by the Planning Society, the UPR's School of Public Administration, and the Association, Dr. Raul Prebisch, Executive Director of ECLA, gave a talk on "Desarrollo Economico en Latinoamerica."

On February 23, 1961, Messrs. Alvin Mayne and Miguel Echenique of the Bureau of Economics and Statistics (Planning Board) presented an illustrated discussion on the Puerto Rican Economy.

The tenth annual assembly of the Puerto Rico Economics and Statistical Association was held at Santurce March 25, 1961. The principal speaker was Antonio Cuevas Viret, Director de Personal, who spoke on "Las nuevas normas de reclutamiento y ascenso para las clases de economistas y estadísticos." Reports were presented by the Secretary and the Treasurer, and officers were elected. The new Executive Committee consists of the following persons:

President—DR. VERNON R. ESTEVES

Vice-President—DR. RAFAEL DE JESUS TORO

Secretary—ERIC CUMPIANO

Treasurer—SARAH LOPEZ DE PICON

Members—GABRIEL RIVERA HERNANDEZ, JAIME SANTIAGO, JUSTINIANO DIAZ MORALES

Volume II of the Association's Journal, *Economics and Statistics Review of Puerto Rico* was published in the early spring of 1961. In January the membership of the Association voted to accept a proposal of the Business Research Center of the College of Business Administration of the University of Puerto Rico.

sity of Puerto Rico to convert the *Review* into a joint publication of the Business Research Center and the Association. The principal advantage is that the publication becomes institutionalized at a considerable financial saving to the Association. The editorial board will have equal representation from the two organizations, with the two top posts being alternated between representatives from the Association and the Center.

#### Rochester

The Rochester Chapter of the American Statistical Association met on December 6, 1960, to hear a talk by Dr. William G. Howe of the Business Operations Analysis Staff, Kodak Office, Eastman Kodak Company. Dr. Howe described and discussed exponential smoothing, a useful device in process control. Exponential smoothing, unlike the method of moving averages, employs a weighted function of all past data.

On February 7, 1961, the Rochester Chapter heard an address by Dr. Milton E. Terry, Mathematics and Research Department, Bell Telephone Laboratories, on "The Computer and Statistics." Dr. Terry discussed problems and techniques peculiar to the field of statistics. These problems arise from the fact that statistical techniques require that a single large body of data be processed by a succession of programs while most data handling problems require that a succession of data be processed by a single program. Dr. Terry described systems now being devised at Bell Labs which are especially appropriate for handling statistical problems.

On March 7, 1961, the speaker was Dr. Arthur Okun, Associate Professor of Economics, Yale University. Professor Okun is associated with the Cowles Foundation for Economic Research at Yale University and is also a consultant to the President's Council of Economic Advisers. Professor Okun discussed the relationship between unemployment and deviation in GNP from a uniform growth rate.

#### Sacramento

The March 16th meeting was addressed by Dr. William R. Gaffney, California State Department of Public Health. The subject of his speech was "A Review of

Technical Statistical Problems Arising in Public Health Research Studies."

The speaker at the April 20th meeting was Walter Hollman, California State Department of Finance. Mr. Hollman spoke on "Harvesting Demographic Data from the 1960 Census."

#### Saint Louis

The Chapter held an Anniversary Meeting on April 20th, the 13th anniversary of the awarding of its charter from the American Statistical Association. Roy Wenzlick, one of the "founding fathers" of the Chapter, spoke on "The Current Outlook for Real Estate, Mortgage Lending and Construction."

Mr. Thomas Dundon, Director of Vital Statistics, Missouri Division of Health, discussed "A Method of Estimating Population for Small Areas in Missouri." Mr. Virgil Seymour of Southern Illinois University, who had been scheduled to speak, was unable to be present.

#### San Francisco

On April 6th the Chapter heard Dr. Henry D. Wolfe, Professor of Marketing at the University of Wisconsin, who spoke on the subject, "Sales Forecasting: Simple Statistical Tools Make It Easy."

The subject of the May 17th meeting was "Applications of Linear Programming." Dr. George B. Dantzig, Professor of Engineering Science, University of California, was the speaker.

Officers for 1961 are:

President—ERNEST C. OLSON  
Vice-President—WILLIAM GOLDNER  
Secretary—MARGARET THAL-LARSEN  
Treasurer—EDWARD SMITH

#### Southern California

At the March 30th dinner meeting the Chapter heard Dr. Olive Jean Dunn of the Division of Bio-Statistics, School of Public Health, University of California at Los Angeles. Dr. Dunn's subject was "Estimation of Multiple Contracts."

The speaker at the dinner meeting of April 27th was R. G. Paul, Assistant Chief of Reliability Assurance, Douglas Aircraft. Mr. Paul discussed "Product Reliability—A Challenge in Applied Statistics."

#### Virginia

The Virginia Chapter of the American Statistical Association held its annual joint meeting with the Statistics Section of the Virginia Academy of Science at the campus of the Virginia Military Institute at Lexington, Virginia on May 12 and 13, 1961. Fifteen papers were presented, covering a wide range of topics in applied and theoretical statistics. Abstracts of most of these papers will be published in the *Virginia Journal of Science*. The meetings were attended by about thirty-five persons from Virginia and surrounding States.

It was decided to continue last year's program of one additional meeting each with the Richmond Section of the American Society for Quality Control and the Northeastern Tennessee Section of the American Society for Quality Control.

New officers elected were:

Chairman—ELIZABETH ANGLE, Federal Reserve Bank of Richmond  
Vice Chairman—JOHN M. LONG, Norfolk Division of William and Mary  
Secretary—RUDOLF J. FREUND, Virginia Polytechnic Institute

#### Washington, D. C.

The topic for the March 30th meeting was "Some Recent Applications of Probability Sampling." Raymond Nassimbene, Office of Statistical Standards, Bureau of the Budget, was chairman. The speakers were Bruce W. Kelly and Harold Huddleston, Agricultural Marketing Service, who discussed "Forecasting Crop Production," and Marvin Wilkerson, Bureau of Labor Statistics, who spoke on "Selection of Cities for the Revised Consumer Price Index."

The April 25th meeting was devoted to a discussion of the recommendations of the Price Statistics Review Committee (Stigler Report). This committee was appointed by the National Bureau of Economic Research at the request of the Bureau of the Budget to review the price statistics of the Federal Government. Ralph J. Watkins of the Brookings Institution was chairman of the meeting. The speakers were Edward F. Dennison, Committee for Economic Development, Sidney A. Jaffe, Bureau of Labor Statistics, and B. Ralph Stauber, Agricultural Marketing Service.

Future Annual Meetings of ASA are as follows:

<u>YEAR</u>	<u>PLACE</u>	<u>HEADQUARTERS</u>	<u>DATES</u>
1961	NEW YORK CITY	ROOSEVELT HOTEL	DECEMBER 27-30
1962	MINNEAPOLIS	LEAMINGTON HOTEL	EARLY SEPTEMBER
1963	CLEVELAND	CASE INST. OF TECH. AND WESTERN RESERVE UNIV.	EARLY SEPTEMBER
1964	CHICAGO	CONGRESS HOTEL	DECEMBER 27-30
1965	PHILADELPHIA	BELLEVUE-STRATFORD HOTEL	EARLY SEPTEMBER

## CONTRIBUTED PAPERS INVITED FOR 1961 ANNUAL MEETING

The 1961 Program Committee invites members to submit papers for the Contributed Papers Sessions at the Annual Meeting to be held in New York City, December 27-30, 1961. The Contributed Papers Sessions are intended to serve especially as a forum for the presentation of individual papers on new developments in statistics. These sessions serve the purpose of broadening the scope of papers at the Annual Meeting to cover new work falling outside the limited number of topics arranged by the Program Committee. It is also hoped that these Contributed Papers Sessions will encourage younger members of the Association to submit papers.

The deadline for submitting topics for Contributed Papers Sessions is August 1, 1961. The complete paper need not be submitted by that date, but it will be necessary to submit a summary or abstract indicative of the nature of the proposed paper. Some restrictions on the number of papers may be required in view of time and space limitations at the Meeting. Submissions may be made to one of the Section program representatives:

<i>Biometrics Section</i>	<i>Business and Economic Statistics Section</i>	<i>Section on Physical and Engineering Sciences</i>	<i>Social Statistics Section</i>	<i>Section on Training</i>
Arthur M. Dutton Box 287, Station 3 Rochester 20, N.Y.	Albert T. Sommers National Industrial Conference Board, Inc. 460 Park Ave. New York 22, N.Y.	Ray B. Murphy Bell Telephone Laboratories 463 West Street New York 14, N.Y.	Eli S. Marks National Analysts, Inc. 1015 Chestnut Street Philadelphia 7, Penn.	Samuel B. Richmond Graduate School of Business Columbia University New York, N.Y.

### PERSONAL NEWS—CONTINUED FROM PAGE 13

States Steel Corporation, in Gary, Indiana. This is one phase of the Advanced Technical Studies program for supervisors which was arranged by John Hromi, newly appointed Plant Coordinator in Operations Analysis.

JOHN B. ROTHROCK resigned from his position at the Pan American Union at the end of March 1961. He has joined the United Nations as a Consultant to Uruguay on trade matters for three months.

O. K. SAGEN, formerly Chief of Special Studies in the U. S. National Health Survey, is now Chief of the National Office of Vital Statistics and Assistant Director of the National Center for Health Statistics, Public Health Service, U. S. Department of Health, Education, and Welfare.

GEORGE L. SAIGER, M.D., Associate Professor in the Division of Epidemiology,

School of Public Health and Administrative Medicine, Columbia University, has received an International Conference Travel Grant from the Social Science Research Council to attend the International Statistical Institute in Paris.

HELEN E. SCOTT is Chief of the Follow-up Section of the Medical Statistics Branch of the Armed Forces Institute of Pathology (AFIP), assigned to the Veterans Administration Central Laboratory, located at Walter Reed Hospital.

IRVING H. SIEGEL, who participated in the preparation of all eight Economic Reports of President Eisenhower to the Congress, rejoined Johns Hopkins University, Operations Research Office, Bethesda, Maryland, in September 1960 and became Chief of the new Military Economics and Costing Division in April 1961.

THOMAS NEIL THROCKMORTON re-

ceived the Doctor of Philosophy degree with major in Statistics from Iowa State University at the Winter Quarter graduation.

DIK WARREN TWEDT, President of Faison & Twedt, Inc., Chicago marketing and psychological research company, and Vice President of the American Marketing Association, has been elected first President of the new Division of Consumer Psychology of the American Psychological Association.

RALPH A. YOUNG, Adviser to the Board of Governors of the Federal Reserve System, has also been appointed Director of the Division of International Finance.

JAMES N. YPSILANTIS, formerly an Analytical Statistician (Demography) in the Population Division of the Bureau of the Census, has transferred to the International Labour Office, Geneva.

### MORE HANDOUTS

There is a growing criticism of the use of blackboards in large rooms during Annual Meetings. Even when meetings are held in well-arranged "theatre" rooms, only those on the first few rows really see the chalk marks. And unless the speaker is equipped with a good, up-to-date walking microphone, he can't be heard when he is talking to the blackboard.

Former President Walter Hoadley, who attends many meetings and speaks frequently, has long been trying to discourage the use of blackboards. Slides and projection machines often give dim and almost illegible images unless rooms are designed just right. In many cities where we must meet from time to time because we are so large, projection equipment costs as much as \$50 or even \$100 for a single two-hour session.

Walter Hoadley urges the use of "handouts". These would contain all the material otherwise to be put on a blackboard. Their use must be well arranged and room monitors should pass out copies to latecomers and maintain a good supply. Our Guide to Speakers urges this. It also contains a few musts. I am hoping that until there are further technological improvements, we can evolve rapidly away from the use of blackboards.

DONALD C. RILEY

### STATISTICAL OPENINGS

Automotive Crash Injury Research of Cornell University, offices in New York City, has openings for persons with good training in statistics. The project involves statistical research into causes of injury in automobile accidents.

Data collected from many states are based on accident investigation by appropriate agencies. Findings assist automotive engineers in designing safer cars. The varied and non-routine nature of the work requires a wide variety of research skills.

One position calls for an M.A. or Ph.D. degree with 2-5 years' experience. Another requires the M.A. and 1-2 years' experience. Good retirement plan, other benefits. Send resume to

**A. C. I. R.**

**316 East 61st Street,  
New York 21, New York**

**TEmpleton 8-4864**

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## 1961 COMBINED DIRECTORY OF STATISTICIANS

At about the time you receive this issue of *THE AMERICAN STATISTICIAN*, you will get your personal questionnaire for the new Membership Directory. Please complete and return this form to the ASA office as soon as possible. The combined Directory will contain listings for all members of the American Statistical Association, Biometric Society, Eastern and Western North American Regions and the Institute of Mathematical Statistics. ASA members will receive a copy of the Directory when published this Fall.

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